DOCUMENT RESUME

ED 107 226 IR 001 964

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TITLE	NASIC at MIT. Final Report, 1 March 1974 through 28 February 1975. Report ESL-FR-587.
INSTITUTION	Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
SPONS AGENCY	National Science Foundation, Washington, D.C.; New England Board of Higher Education, Wellesley, Mass.
PUB DATE	28 Feb 75
NOTE	103p.
EDRS PRICE	MF-$0.76 HC-$5.70 PLUS POSTAGE
DESCRIPTORS	*Computer Oriented Programs; Cost Effectiveness; Information Needs; Information Retrieval; Information Systems; Library Cooperation; Library Networks; *Library Reference Services; On Line Systems; *Program Evaluation; Publicize; *Regional Programs; Search Strategies; Training; *University Libraries; Use Studies
IDENTIFIERS	Computer Based Reference Services; Massachusetts; Massachusetts Institute of Technology; MIT; NASIC; NEBHE; New England; New England Board of Higher Education; *Northeast Academic Science Information Center

ABSTRACT

Computer-based reference search services were provided to users on a fee-for-service basis at the Massachusetts Institute of Technology as the first, and experimental, note in the development of the Northeast Academic Science Information Center (NASIC). Development of a training program for information specialists and training materials is described. Testing, user surveys, and 15 months of operational experience show that: (1) a moderate but growing demand exists for computer-based reference search services; (2) 77 percent of users perceive the service to be cost-effective; (3) promotional efforts need to be very intense both to increase general awareness of the service and to turn awareness into actual use; (4) many different promotional mechanisms are needed; the best are oriented toward the immediate, personal needs of the potential user; (5) cost affects the class of user, but it is only one of many factors that influence a person's decision to use the service; (6) searches are often interdisciplinary and require several sources; (7) information specialists need extensive training and practice searching to attain desirable levels of competence; and (8) integration of these services within the library environment may require organizational and staffing accommodation in addition to the commitment and enthusiasm of participants. (Author)

ED107226

February 28, 1975

Report ESL-FR-587

NASIC AT MIT

FINAL REPORT

1 March 1974 - 28 February 1975

by

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The research reported in this document was performed under contract to the New England Board of Higher Education in connection with their NASIC Program funded by the National Science Foundation.

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IR 001 964

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ABSTRACT

Computer-based reference search services to users on a fee-for-service basis at M.I.T. continued as the first, and experimental, node in the development of the Northeast Academic Science Information Center (NASIC) under a New England Board of Higher Education (NEBHE) program. Development of a training program for information specialists and training materials is described. Testing, user surveys, and 15 months of operational experience show that: (1) a moderate but growing demand exists for computer-based reference search services; (2) 77 percent of users perceive the service as cost-effective; (3) promotional efforts need to be very intense both to increase general awareness of the service and to turn awareness into actual use; (4) many different promotional mechanisms are needed: the best are oriented toward the immediate, personal needs of the potential user; (5) cost affects the class of user but it is only one of many factors that influences a person's decision to use the service; (6) searches are often interdisciplinary and require several sources; (7) information specialists need extensive training and practice searching to attain desirable levels of competence; (8) integration of these services within the library environment may require organizational and staffing accomodation in addition to the commitment and enthusiasm of participants.

ACKNOWLEDGEMENT

The active interest in the development of NASIC on the MIT campus by Natalie Nicholson, Director of the MIT Libraries, and Robert Scott, Director of the Information Processing Services, and the contributions by them and their staff are valued. We would like to make particular reference to members of the library adminstration, Margaret Otto and William Duggan, and to the heads of the five divisional libraries: Edgar Davy, Margaret DePopolo, Irma Johnson, James Kyed, and Frances Sumner.

Special acknowledgement is given to our information specialists -- Marge Chryssostomidis, Ann DeVilliers, Christine Franchi, Pat Gordon, Irene Laursen, Ann Longfellow, Hedy Mattson, Jackie Stymfal, Nancy Vaupel, and Susan Wordford -- who provide the service that NASIC is all about, whose enthusiasm and commitment are infectious, and to whom we owe a special debt of gratitude.

Our appreciation is also extended to Diane McLaughlin, the Assistant to the NASIC Coordinator, for her cheerful aid in the coordination of the many activities supporting the service.

We also wish to acknowledge the work done by Richard H. Rosenthal, a student at the Simmons College School of Library Science, in reducing some of the data gathered about each user and search session.

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I. INTRODUCTION AND OVERVIEW

An experimental, pilot operation of computer-based reference search services to users on a fee-for-services basis was initiated at M.I.T. on November 15, 1973. It marked a major milestone in the development of the Northeast Academic Science Information Center (NASIC). NASIC development is supported by a grant from the National Science Foundation to the New England Board of Higher Education (NEBHE). Development and analysis of a pilot operation at M.I.T., and development of a training program, was supported by subcontract from NEBHE to M.I.T. The NASIC at M.I.T. project team included staff from the M.I.T. Libraries, the Electronic Systems Laboratory, and the Information Processing Services. This final report covers the work performed on NASIC at M.I.T. from March 1, 1974 through February 28, 1975. This period falls within Phase 2 of NASIC.

The initial work, called Phase 1 and conducted from July 16, 1973 through February 28, 1974, has been reported in detail elsewhere (1). Portions of the earlier work are summarized in this report whenever appropriate for continuity of understanding.

This report is organized into seven sections. The more important findings are highlighted in the remainder of Section I. Section II summarizes the accomplishments of the specific tasks undertaken by MIT on its NASIC subcontract during this past year. Section III discusses in detail the tasks associated with training of NASIC/Central and MIT staff, the development of a NASIC training program, and the development of training materials. Section IV discusses the computer-based reference services provided by the MIT Libraries, including the improvements in operation that have occurred. Section V gives statistics of use of the service at M.I.T. during the last year. Analysis of the receptivity to this service by the MIT community and other analyses of the service are included in Section VI. Section VII gives a comparative evaluation of the various promotional techniques. Appendices contain additional information supporting the discussions in sections III through VII.

The more important findings of our development and testing effort for NASIC are highlighted below:

1. A moderate but growing demand exists for interactive computer-based reference search services on a fee-for-service basis at M.I.T. A total of 316 searches occurred in the year. Of the total, 114 searches were performed on the MEDLINE data base and 202 on the other, NASIC data bases. The growth curve is indicated by the quarterly search totals which were, respectively 47, 64, 85, and 120 (see Fig. 1).

2. The service has been very well accepted by the users. In a formal study of users of the service over 90 percent of the users said they found the service satisfactory and 50 percent were very satisfied. Only 14 percent of the users did not find the service cost effective whereas 77 percent thought the service was worth the charges and 9 percent had mixed reactions. At least 30 percent of the customers were repeat users.

3. An informal survey of non-users indicated that, given the proper circumstances, these people would use the service. The main reasons for non-use were lack of awareness of the service or its benefits, lack of access to funds to pay for service, and absence of an immediate need for reference searching.

4. Promotional efforts need to be very intense, even considerably more than the fairly intense MIT efforts to date. A variety of promotional mechanisms must be actively pursued both to increase general awareness of this new, and generally untried, service among potential users as well as to turn awareness into actual use, which requires stepping over a fee-for-service threshold.

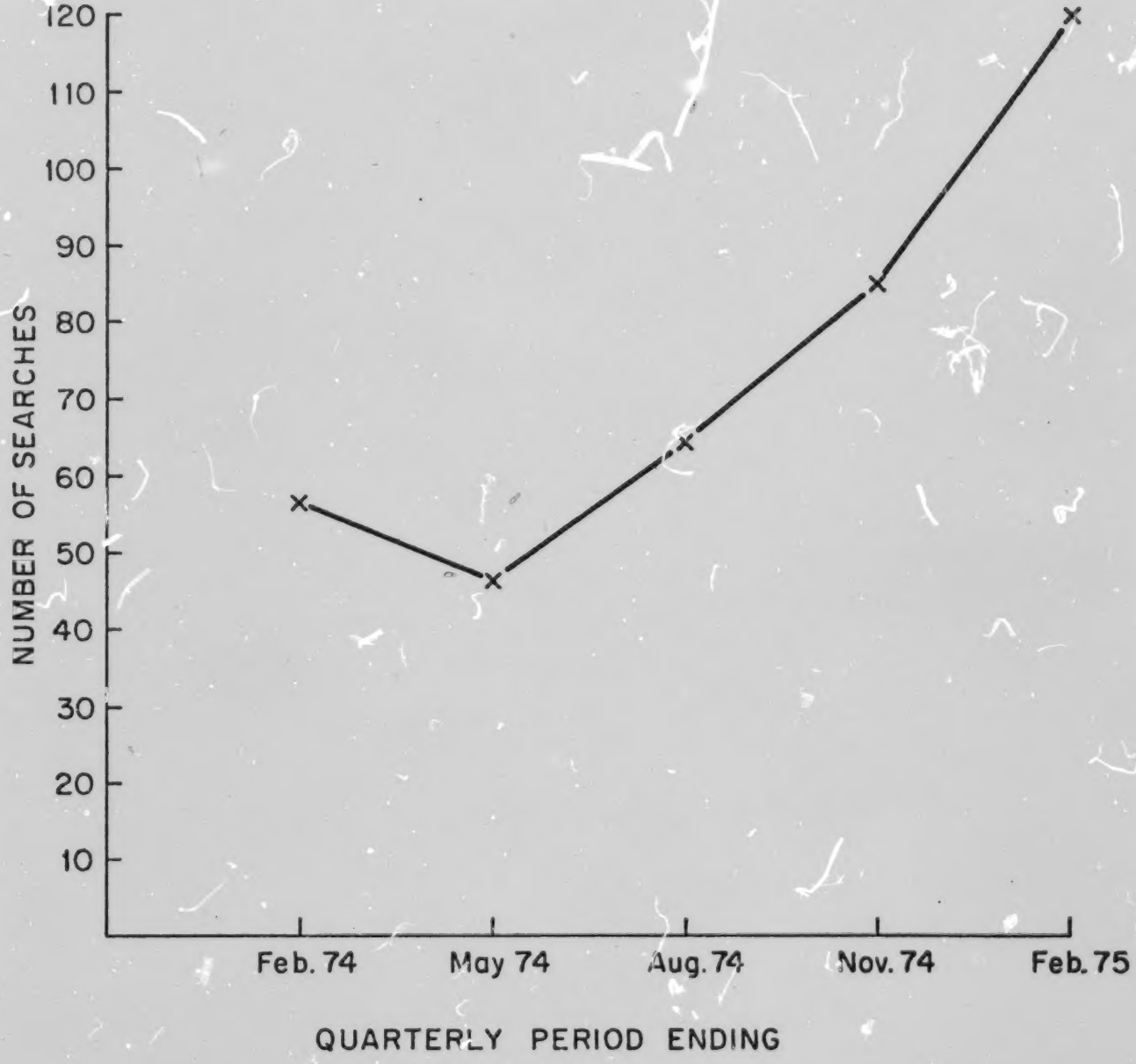

Fig. 1 Number of Searches by Quarter, December 1973 through February 1975

5. All the publicity mechanisms we have tried have been at least somewhat successful. Awareness about the service is most often achieved by word-of-mouth, but direct mailings of brochures and other printed resources are often the catalyst for "Hey, have you heard about NASIC?" Translation of awareness into use requires additional effort in demonstrating cost effectiveness of the service. Search demonstrations at the terminal are most effective when they can be oriented to the current needs, often interdisciplinary, of the audience; canned demonstrations are much less effective.

6. Cost affects the class of user. Industrial users are less concerned than academic users about cost. Undergraduates and others with no recourse to monies other than personal funds do not use the service in any significant numbers.

7. Cost is only one of many confounding factors that may motivate a person to use the service. Others are method of promotion, need, prior familiarity with the data base, availability of funds, complexity of the search, urgency of results, convenience, and influential or peer users. Threshold effects associated with cost or with the other factors can influence demand.

8. The terminal connect time spent in searching a data base on-line correlates positively with the size and comprehensiveness of the data base. The on-line search time is inversely correlated with the cost rate but it is a much weaker correlation than that for file size.

9. The interest in any single data base is heavily interdepartmental. Individual departments have multidisciplinary interests in several data bases. Interests also cross between the science and technology sphere and the social sciences and humanities areas.

10. In the last year, a typical NASIC appointment lasted 57 minutes, 65 percent (37 minutes) or which was spent on-line. Of the NASIC searches 43 percent had an associated request for off-line printouts. When printouts are obtained they contain an average of 173 citations. The actual average cost to a user was $45.96 for computer connect costs plus administrative costs, and, if they applied, $7.84 for the time of the information specialist, and $20.75 for off-line printouts. Typical costs associated with MEDLINE searches for computer time plus administrative charges, specialist time, and printouts, are respectively, $13.00, $8.81, and $5.84; MEDLINE appointments ran 65 minutes, of which 41 minutes was on-line, and 65 percent of the searches had an off-line printout request.

11. Extensive training of information specialists is initially required. A considerable amount of practice searching is an essential element of such training. It takes additional experience before an information specialist will be fully confident, adept and at ease with his or her professional ability. We believe the high-quality service provided by such a well-trained specialist is essential to the high-level of favorable user response we have noted above.

12. The workshops and manuals currently provided by the computer search services often need augmentation if the high level of training noted above is to be obtained. A training program was developed for NASIC which includes workshops, each lasting two and a half days, followed by one or two day on-site visits by NASIC/Central staff to review progress in practice searching by trainees. Documentation in support of this program has been prepared and it includes data base and other manuals which combine previously scattered information as well as report new information.

13. The computer search services and the data bases continually undergo change. An important element in the duties of an information specialist is to keep abreast of these changes with continued "training."

14. Computer-based reference services complement but do not replace more traditional search modes. An administrative guide has been prepared which surveys the areas in which decisions need be made in planning such services. Organizational and staffing accomodations may be required for effective integration of the service into the library. An essential ingredient for a successful service is enthusiasm and commitment by the staff involved.

15. While computer-based reference services are currently cost effective in many contexts, user and information specialist criticisms have clearly indicated a number of areas in which improvements in the communications network, the retrieval system, the data bases, and the local service mechanisms, are needed. These are: better reliability; more comprehensive data bases; more comprehensive indexing; more uniformity among data bases and systems; greater simplicity of use so that some users can do theri own searching; and easier access to the full text of the documents.

In our previous report (1), major functions of a regional NASIC organization with decentralized end-user services were identified. Additional experience over the last year in providing services has only reinforced these views which we reiterate below. The major functions of a strong central regional NASIC organization are:

1. Advise academic institutions on preparing for, implementing, and publicizing computer-based reference services.

2. Offer programs to train staff to levels of competency in understanding and providing such services that extend beyond current programs of retrieval system suppliers.

3. Provide a central capability to search those systems or data bases that are only of infrequent use to an academic institution.

4. Provide a strong, collective voice for the region in dealing with retrieval systems, data base suppliers, terminal manufacturers, or other external agencies.

5. Provide a mechanism for disseminating within the region updated information and solutions to problems of common interest.

In short, a regional NASIC is needed to function as a strong user association, a center with the expertise, staff, and time to daily make suggestions and provide feedback among individual academic institutions and a variety of diverse information or equipment suppliers.

An organization may choose to implement these services entirely on its own; but in so doing, more of its resources will be required in order to fully realize the benefits from extending its services to both current and new library users. These services are exciting because they ultimately touch upon, indeed should be integrated with, a wide spectrum of information services, but they are also exacting in their implementation if their potential is to be realized. A NASIC that functions as a strong central association of members could considerably ease this process with consultation, with training, with back-up services, with collective voice to suppliers, and with feedback to members.

II. DESCRIPTION OF PHASE TWO PROJECT WORK BY TASK

A number of tasks were performed by MIT during phase 2 under contract from NEBHE. These tasks are summarized below. More than half of MIT's effort was concentrated on the development of a training program and related materials for information specialists. The provision of actual NASIC services to the MIT community has not received direct contract support.

Preparations and Submittals of Phase 1 Report (Task 1) and Final Report (Task 6)

A report (1) was prepared and submitted to NEBHE which summarized the experiences, conclusions, and recommendations resulting from all tasks performed by MIT during phase one. The present report covers phase two activities and constitutes the final report

Analysis and Documentation of Institutional Survey Results (Task 2)

During the Fall of 1973, MIT staff participated with NEBHE and ARL (Association of Research Libraries) staff in site surveys of information centers at the University of Georgia, Illinois Institute of Technology Research Institute, University of California at Los Angeles, Ohio State University, University of Florida, and the North Carolina Science and Technology Research Center. MIT completed its assessments of the operation, economics, management, and use of these centers during the Spring of 1974. This material subsequently was incorporated into an overall assessment by NEBHE and issued as an appendix to their NASIC Phase 1 Report (2). The MIT assessments have also been used as background for an ARL Management Supplement (3).

Training and Development of Training Materials (Task 3)

This task encompassed the majority of effort expended by MIT on the contract. The details are discussed in section III but it comprises:

1. Initial training of NASIC/Central staff
2. Additional training of MIT and NASIC/Central staff

3. Development of a program to train staff of other institutions
4. Preparation and oral presentations of training materials at a series of training workshops, including detailed outlines of these presentations
5. Preparation of a written manual covering the commands and messages of the SDC ORBIT retrieval system
6. Preparation of written manuals covering the Chemical Abstracts Condensates, ERIC, CAIN, GEO-REF, COMPENDEX, and INFORM data bases and their implementation by SDC
7. Preparation of a written administrative guide to decision areas in planning the implementation of computer-based bibliographic information services.

Market Test and Analysis (Task 4)

This task, partially supported by NEBHE, involved the development of a marketing plan for the Fall 1974 semester and the design and implementation of a user questionnaire and survey to test the receptivity of NASIC services at MIT. An overwhelmingly satisfactory response to the service has been received. Details of the market analysis are discussed in Section VI.

Operational Data Collection (Task 5)

Data concerning the operational NASIC services provided by the staff of the MIT Libraries has been gathered periodically and forwarded to NEBHE. This task has been supported only partially by NEBHE. The operational service at MIT and its use are described and analyzed in detail in Sections IV, V, VI, and VII.

Management and Consultation (Task 7)

In addition to the necessary contract negotiations and managerial support for the above tasks, MIT staff have jointly participated with NEBHE staff in numerous meetings covering consultative, analytic, and related activities associated with the development, training, provision, pricing, and publicity for NASIC services. In addition, MIT and NEBHE have gathered and exchanged information about current and planned developments in external on-line search services and data bases.

III. TRAINING AND DEVELOPMENT OF TRAINING MATERIALS

Initial Training of NASIC/Central Staff

A modified and informal version of the initial training program given in the Fall of 1973 to the MIT information specialists (1) was instituted for the initial training of Patricia Vaughan and Don Morrison of the NASIC/Central staff. Several modes of instruction by MIT staff were used: discussion and lectures on general and specific points of information retrieval using on-line search systems; assignments; terminal practice search sessions; observation of actual search sessions conducted by MIT information specialists; search sessions conducted by the trainees with a user and in the presence of an experienced searcher. The initial training was limited to the SDC ORBIT retrieval system and to the CHEMCON, ERIC, CAIN, GEO-REF, COMPENDEX, and INFORM data bases. By the time the initial training period (April-June, 1974) had concluded the NASIC staff had acquired considerable facility in the use of the ORBIT search service and its data bases. They were technically competent to offer search services at their own site in Wellesley and to provide partial instruction to others in need of training. As a prelude to offering a search service of thier own, NASIC/Central staff gained additional experience in a working environment by occasionally serving as an information specialist at MIT. Further training of NASIC staff proceeded in concert with (a) further training of the MIT information specialists, and (b) development of the training program and materials, and workshop presentations.

Additional Training of MIT and NASIC/Central Staff

Further training and practice searches were provided to both the MIT information specialists and the NASIC/Central staff on two additional SDC-implemented data bases: NTIS and SCISEARCH. Additional information about the ORBIT system, and the training techniques used by SDC, was obtained at an SDC workshop in Falls Church, Virginia on June 17, 1974, attended by NASIC staff and some MIT staff.

Beginning in July 1974, training and practice searches were extended to the Lockheed DIALOG retrieval system and its implementations

of the CAIN, COMPENDEX, ERIC, INFORM, INSPEC, NTIS, PREDICASTS, PSYCHOLOGICAL ABSTRACTS, and SOCIAL SCISEARCH data bases. The Lockheed DIALOG training was aided by a workshop held in Wellesley on July 1 and 2 at which a Lockheed representative, Mr. Robert Donati, provided instruction. The workshop included terminal practice sessions to exercise DIALOG commands as well as data base characteristics. Self-instruction and practice searches were the prime methods for continued training on DIALOG and its data bases. More formal and supervised methods were unnecessary because: (a) the 10 trainees were already experienced searchers, albeit with a different retrieval system; or (b) the trainees were familiar with most or all of the data bases and needed to learn only their implementation on Lockheed DIALOG.

As the retrieval systems underwent modifications for improvement, and as they added new data bases of interest, the principal vehicles for the information specialists at NASIC/Central and MIT to keep abreast have been the explanatory or descriptive materials issued by the systems and additional self-paced practice searches and study. These are the principal methods currently used for continuing education.

Two rules of thumb derived from experience and concerning on-line practice by trainees may be of interest to readers. These are:

(1) A trainee who is learning to use a retrieval system plus two or three of the data bases implemented by the system, requires a minimum of eight to ten hours practice of on-line connect time to achieve a reasonable level of search skill and understanding.

(2) A trainee who is familiar with a retrieval system but who is learning the implementation of a new data base on that system requires a minimum of two to three hours practice of on-line connect time to achieve a reasonable level of search skill and understanding.

The practice search periods should not be continuous but rather interleaved with study and review. It is extremely helpful if a trainee is able to consult an experienced searcher who can answer questions, review practice search printouts for errors, and otherwise provide tutorial assistance. While it is best for each trainee to receive these minimum

amounts of practice search time, it is also possible to cut the connect time cost per trainee almost in half if two trainees work together at a single terminal, each actively taking turns at the keyboard. Three trainees at one terminal is considerably less efficient.

Development of a Program to Train Staff of Other Institutions

MIT and NASIC/Central staff collaborated on the development of a training workshop for staff from other institutions. The development drew upon the experiences with and the substance of the training programs and methods employed to date. A major constraint was the desire to limit the workshop to two and a half days in order to minimize the impact on reference staff schedules and travel budgets of participating institutions, especially in view of the fact that two or three persons from each institution would be present. The initial training programs for MIT and NASIC/Central staff were the equivalent of three to four weeks, similar in length to the National Library of Medicine's programs (refer to the phase one report for details). Consequently, the workshops would have to provide a good introduction and orientation to the relationships among the components of an interactive search so that the trainees might be better able to continue their training and practice largely on their own upon return to their institution, with one-or-two-day follow-up visits and reviews by NASIC/Central staff.

Other major considerations were to: (1) balance presentation of the theoretical with the practical; (2) interleave lectures with practice search applications; (3) provide as much time as possible for on-line practice searches; (4) provide opportunities for general discussion, questions, and review; (5) encourage rotation of trainees at terminals to maximize individual hands-on experience; (6) have experienced information specialists present in each practice terminal room to provide assistance and respond to questions; (7) provide outlines of presentations, including illustrations, both to reduce note-taking and to provide documentation for at-home reference; and (8) provide additional specific searches and other materials for practice and study at home.

The workshops that have been held, beginning in September 1974,

generally have addressed the topics listed in Appendix B. The orderings of the topics, the specific retrieval system (SDC or Lockheed), and the specific data bases covered, have varied from one workshop to another, as has the instructional staff. Presentations on the specific retrieval systems, and some commentary on data base implementations, have been given by a system representative.

Preparation and Oral Presentations of Training Materials at a Series of NASIC Workshops

MIT staff have participated in four NASIC workshops: Workshop IA held September 4-6, 1974; Workshop IB, held October 2-3, 1974; Workshop IIA, held November 20-22, 1974, and in Workshop IIB held December 4-6, 1974.

The formal MIT staff activities at these workshops is summarized in Appendix C. MIT staff also participated informally in the workshops by aiding trainees from other institutions in their on-line practice searches and through informal discussions, and by raising points of information or clarification not brought out in the formal presentations by retrieval system representatives.

One of the major goals of the MIT-NEBHE contract has been the development of expertise among the NASIC/Central staff through training and knowledge transfer processes. MIT staff handled most of the presentations at the first two NASIC workshops, some of which were taped for the benefit of NASIC/Central staff. With successive workshops, the NASIC/Central staff successfully undertook more and more of the responsibility for these presentations, such that they were able to assume the role of principal instructors at the fifth workshop. The NASIC/Central staff have incorporated the materials prepared by MIT staff into their presentations.

The content of the workshop oral presentations have drawn upon information researched and gathered about data bases, retrieval systems, and information science essential to the functioning of information specialists. In many instances, new information not previously documented was presented. The presentations also drew upon experience in working with these systems and data bases. Detailed outlines and illustrations for all of these pre-

sentations were prepared for handout. Real-user searches of the data bases were specially selected, annotated, and included in the handouts as sample searches.

The importance of continuing self-study and practice beyond the workshop was noted earlier. Consequently, part of the presentation covered a framework for studying retrieval systems and data bases. An associated check list is reproduced in Appendix D. It may serve as a reminder of the myriad components and interrelationships among retrieval systems and data bases. It is an important indicator of the knowledge and skills required of information specialists and why a significant investment in their training is necessary.

Preparation of a Written Manual for the SDC ORBIT Retrieval System

A manual titled "The SDC ORBIT Retrieval System -- A Supplementary Guide to its Command and Message Features" was prepared by A. R. Benenfeld and submitted to NEBHE. It is an in-depth review of the SDC ORBIT commands and messages, other than those associated with the logging-in or system connection process. The guide supplements, but does not replace, the information in the SDC ORBIT User Manuals for their data bases.

The guide is arranged in two parts. Part one concentrates on the ORBIT commands with particular attention given to the default commands of search statement, stringsearch, and sensearch, as well as to the print command. Part two concentrates on ORBIT messages with particular attention given to conditions of overflow and to the decisions associated with a multi-meaning message.

The introduction to the guide notes its potential utility to trainees, instructors, and working information specialists. Whether a searcher is in a learning mode or is more experienced, many interacting events, often unanticipated, transpire at a search session. Searchers, regardless of their level of experience, need a reference source that goes beyond the basic explanations usually found in a system's user manuals which will help them to understand better the actions and interactions of their

session with the system. In this guide searchers can read about individual ORBIT commands and messages to whatever depth is found personally desirable and comfortable. Instructors can choose material to highlight to different audiences. Experienced searchers can use it for reference or occasional review.

Preparation of Written Data Base Manuals

Detailed manuals describing the characteristics and retrieval system implementation of six data bases were prepared by the following MIT information specialists and submitted to NERHE.

Susan E. Woodford Science Library	-	The CHEMICAL ABSTRACTS CONDENSATES Data Base
Nancy G. Vaupel Humanities Library	-	The ERIC Data Base
Jacqueline Stymfal Dewey Library	-	The INFORM Data Base
Marge Chryssostomidis Barker Engineering Library	-	The COMPENDEX Data Base
Ann S. Longfellow Rotch Library	-	The CAIN Data Base of the National Agricultural Library
Hedy Mattson Lindgren Library	-	The GEO-REF Data Base

The objective of these manuals is to aid other information specialists in understanding the data base content and the similarities and differences among the printed form (if any) and computer retrieval system versions. The manuals emphasize distinctions among index files, catalog record files, and separate search aids such as thesauri. Information is given about the data base in general, as well as source publications coverage, subject coverage, abstracting, indexing, and catalog record content. Data base implementation by retrieval systems, particularly in terms of content and indexing, is described. A detailed outline of the information contained in these data base manuals appears in Appendix E. These data base guides are intended as a supplement to, not a replacement for, individual system user manuals.

Each manual summarizes data base information that, in many cases,

is currently available only in scattered sources, if at all. A fair proportion of this information has not been previously documented. In preparing these manuals, the information specialists not only drew upon existing source materials, but also their own experiences and research into the data base, including, in most cases, discussions with the data base publisher's staff. The raw information provided the basis of the oral presentations given by the specialists at the NASIC workshops (see subtask 3.4 above) and it was subsequently expanded and developed into detailed written manuals. The oral presentations and associated outlines and handouts covered data base implementations on SDC ORBIT and Lockheed DIALOG, as appropriate to the specific workshop. The written manuals submitted to NEBHE describe the ORBIT implementation; the sections are so arranged that, with additional staff and dollar resources, they can be easily updated and expanded to cover Lockheed and other retrieval system implementations of the data base.

A foreword to each of these manuals notes its potential utility to trainees, instructors, and working information specialists, all of whom have need of a comprehensive reference guide to the different versions -- printed and computer-stored -- of a data base.

Preparation of an Administrative Guide to Decision Areas in Planning the Implementation of Computer-based Bibliographic Information Services

A "Guide to Decision Areas in Implementing Computer-Based Bibliographic Information Services" (4) has been prepared and issued as a report. It is addressed to administrators in organizations undertaking the planning for implementation of these services in a library. It comprehensively enumerates the kinds of decisions necessary to establish an effective service. These are categorized into twelve major areas:

1. Services
2. Service Organization
3. Staff
4. Staff training and continuing education
5. Promotion of services
6. Pricing

7. Service sites and facilities
8. Staff office facilities
9. Materials and supplies
10. Funding and budgeting
11. Billing users and accounting
12. Communications and feedback

In addition to the checklist, some of the particular problems or points associated with each decision area are highlighted with a brief discussion.

Institutions differ in their operating environment and in the kind and degree of organizational, staffing, budgetary and other related constraints which influence the decision-making process, if not predetermine the decision outcomes. It is essential that each organization arrive at decisions appropriate to its own environment and to develop a plan and timetable of its own for the implementation of services. For these reasons, the administrative guide does not include the results of the decision processes at MIT or other institutions which have implemented these services. The experiences of MIT have been reported elsewhere (1) and are updated in section IV below. Readers are also referred to the ARL Management Survey (3).

IV. DESCRIPTION OF SERVICE OPERATIONS

The daily NASIC service operations provided by the MIT Libraries are described in this section, although, with the exception of some promotional activity, these operations have not received direct contract support. The test of receptivity of the services by the MIT community and other detailed analyses reported in sections V-VII may be more meaningful with the description of the services below. The initial development (on contract) of the service in 1973 as the first NASIC test site was extensively documented in the phase one report (1) but a brief summary is given below. Several modifications to the service operation have since been made by the MIT Libraries and these are described in somewhat greater detail.

Summary of the Initial Service Operation (November 15, 1973 - February 28, 1974)

The service organization reflects the decentralized MIT Library system with a central administration. End-user service is provided in the divisional libraries by six information specialists who were drawn from the reference staff and who integrate their part-time NASIC duties into their other public service functions. User service is by appointment and users are charged for service. Appointment bookings and bill preparation are handled centrally by an assistant to the Library's NASIC coordinator. The assistant also answers general inquiries, maintains user files, distributes printouts, and maintains and summarizes service activity log sheets and statistics. The Coordinator has responsibility for service planning, user education, promotion, and public relations, and acts as a liaison with the divisional heads, the information specialists, the ESL staff, with NASIC/Central, and with the commercial search services. The initial services offered were CHEMCON, ERIC, and INFORM from the SDC ORBIT system and counterpart off-line services from the University of Georgia. No user requested the off-line search service in this period. In addition, the MIT Science Library provides MEDLINE services, and although not part of NASIC, it is serviced and promoted to the entire community through the NASIC Coordinator, thus avoiding a proliferation of service contact points as seen by a user. Half of the users in the initial

period requested MEDLINE.

The user is asked to fill in a statement describing his problem in advance of his appointment. The statement primes both the user and the information specialist to reflect on the scope and depth of the problem prior to a search in order to maximize the effectiveness of their interaction at the time of the appointment. Careful thought prior to a search should improve the search strategy as well as minimize the overall cost to a user. Appointments in the initial period averaged 70 minutes in length, of which half that time, 37 minutes, was spent connected to the computer retrieval system.

The pricing algorithm for charges to a user had three components: (1) a direct computer search cost which was the sum of the cost from the supplier plus a surcharge for partial recovery of administrative costs; (2) a pro-rated direct charge for the time of the information specialist (also partial cost recovery); and (3) a direct charge for the full cost of off-line printouts. The rates for the first and third components varied with the retrieval system and data bases searched; the MEDLINE search rates were set in accordance with National Library of Medicine policy. The information specialist time charge was forgiven users as a means of helping to introduce and promote the service. Users can elect to charge services either to a research grant or to a personal account; users can also elect to pay immediately by cash or check. Charged services are billed through the MIT Accounting Office. In the initial period, 80% of MIT users charged services against a research account; the remaining 20% paid directly by cash or check. The average cost for a NASIC search in this period included $34.90 for computer and administrative charges, $9.36 for information specialist time charges (forgiven MIT users), and $6.21 for printout charges (only 60% of users requested off-line printouts). Costs for a MEDLINE search were $13.86, $9.32, and $4.53 for the respective categories; the computer connection costs of searching MEDLINE are heavily subsidized by the National Library of Medicine.

Several promotional mechanisms were initiated. These included brochures, selective mailings, newspaper articles, talks, and demonstrations. While the various promotional mechanisms are each successful to some degree, word-of-mouth by satisfied users is the most important mechanism. Promotion is discussed in greater depth later.

Summary and Analysis of Changes in Services and Operations (March 1, 1974 - February 28, 1975)

Growth and improvements led to several changes in the services offered and the operations supporting them in the last year. The number of data bases handled was expanded to include, on the SDC ORBIT system, COMPENDEX, CAIN, NTIS, GEO-REF, and SCISEARCH. These data bases were phased-in between May and September 1975. In addition, the information specialists received training on the Lockheed DIALOG system during the summer so that by the opening of the Fall 1974 semester the number of new data bases capable of being searched by the staff increased to include INSPEC, PREDICASTS, PSYCHOLOGY ABSTRACTS, and SOCIAL SCISEARCH. CHEMICAL ABSTRACTS CONDENSATES, ERIC, NTIS, COMPENDEX, CAIN, and INFORM were now searchable by the staff on either SDC or Lockheed. MEDLINE services include all of the major MEDLINE files.

Four additional information specialists were trained: Ann M. DeVilliers, Christine L. Franchi, Irene Laursen, and Hedy Mattson. Three received training through the NASIC Workshops; one also attended an SDC training program, one worked with MEDLEARN, the NLM tutorial package; and all received counseling from the trained staff.

The data base responsibilities of the information specialists have changed. The first six had received training on the initial three data bases, partly because the initial demand for service was unknown, partly because we had wished to make the service as convenient as possible geographically on a large campus, and partly to test limits of saturation on the number of data bases a specialist can handle. Demand grew slowly but it became apparent that users were generally agreeable to walking some distance to their appointment. Low demand also meant that each specialist was not receiving enough appointments to maintain and exercise skills on a number of data bases. Consequently, the data base responsibilities of the

information specialists have since been limited to those that are mainly, but not exclusively, in the subject areas addressed by their respective libraries. Some specialists have expressed a personal preference to handle a broader range of data bases; most are content with the reduced responsibilities because of other duties and demands on their time. Three of the four new specialists have been trained on only a single data base each, but most specialists currently handle two to four or five data bases. This shift in responsibilities has resulted in one major drawback. Users are problem oriented, not discipline or department oriented. Data bases and library collections tend to be discipline oriented. Thus, some of the interdisciplinary users who have need to search more than one data base now must make an appointment with more than one specialist in more than one library with a resultant inconvenience and interruption in the service they receive.

No changes have been made in the original five divisional library sites at which service is provided, but service is now provided also from the Lindgren Library which is the earth sciences branch of the Science Library. Decoration of all sites was completed this year. The NASIC Coordinator's office was moved from facilities shared with the Barker Engineering Library to quarters of their own which are physically located on the mezzanine above the Science Library.

The time schedule of several hours of NASIC duties each day for information specialists was considerably revised to reduce conflicts with their non-NASIC duties. The current schedule contains longer continuous blocks of time arranged over a two-or three-day period, with other days completely free of NASIC work. The total number of hours each specialist is available varies with their data base responsibilities, but, with one exception, no specialist is available for more than fifty percent of her work week.

A useful rule of thumb derived from experience is that for the detailed and intense user interaction and search service provided at MIT, three searches per day per information specialist is an upper limit on the number that can be processed without undue fatigue and loss of efficiency by a specialist.

The availability of off-line searches (retrospective and current awareness) through the University of Georgia was publicized through June but only limited interest in off-line machine searches was expressed and no such search was actually commisioned. From discussions with potential users this was partly because of cost and partly because off-line retrospective coverage did not cover a significantly greater number of years beyond on-line coverage. Consequently, off-line access was dropped as an available service.

Some experimentation has since been undertaken with two or three users in providing them with periodic on-line current awareness services. In providing this service on a small scale we hope to gain the experience by which to understand better the costs involved and the procedures that may be required to provide such a service on a larger scale. The solutions are closely tied to the costs of any mechanisms that may be made available by the commercial services for saving and storing searches on-line, and even the automatic periodic running of the searches by these companies. These features are not yet available. In the meantime, the Libraries have not yet had sufficient experience with the periodic re-entry of current awareness searches to say what procedures might work best and at what cost. We can note that the few users of this test service have found it to be successful and helpful and that they have also subsequently done other retrospective searches.

The three terminals currently shared by the divisional libraries are now Computer Devices Incorporated (CDI) Teleterm 1030 terminals. Previously, Texas Instruments Silent 700 terminals were used. Both makes are portable, thermal printers with 30 characters/second capability. The switch in leased terminals was made because the CDI's are more compact and lighter than the TI and just as reliable and quiet. Equivalent light terminals are currently available from several manufacturers. Lighter-weight terminals are usually newer models and tend to be slightly more expensive than older, heavier models of a manufacturer. The additional expense is more than justified for us by the gain in maneuverability.

Beginning last Spring, the responsibilities placed on the information specialists to submit writeups highlighting their interactive sessions with users were reduced because sufficient data had been gathered by then to characterize the sessions sufficiently for our analysis purposes. The depth of writeups currently submitted is entirely at the discretion of the specialist, but the logic used for a search is almost always submitted. Additional data for study is available, of course, from the billing information. We have found that maintaining the specialist's report is useful (1) in answering any further questions about the session or its costs; (2) in subsequently doing an extended or related search for the user; (3) in reviewing and analyzing the operation.

Two logs, one for NASIC and one for MEDLINE service activity, were developed and are maintained by the Coordinator's assistant. The logs are the first step in providing reduced data from the individual forms, reports, and bills associated with each user session. It is relatively easy to tabulate and cross-tabulate data from the logs. Condensations of this data are sent monthly to interested staff and are particularly helpful in identifying for each divisional library the kinds of search problems addressed by their users. Additional statistical summaries are generated quarterly. The basic logs contain the following information, some of it coded, whenever it is applicable to a user session:

Date of service

Information Specialist

Library site

User name

Indicator for a repeat user

Retrieval system searched

Data base searched

Mode of service (appointment with specialist, delegated to specialist, delegated to a non-specialist librarian working with the specialist)

Regional Medical Library user and search purpose codes (for MEDLINE searches only)

User's affiliation (or department for MIT users)

User's ststus (for academic users only)

Publicity mechanism through which user learned of NASIC services

Mode of payment for service

Computer connect time

Charge to user for connect time (includes administration surcharge and telecommunication cost)

Appointment length

Charge to user for specialist time (no longer in effect)

Offline printouts requested by number of citations and/or number of pages

Date printout received by Coordinator's office

Charge to user for printout

Allowances or credits given to user

Total user charge

Date the bill is sent to MIT Accounting Office

Brief title of search

The forms underlying the logs generally have received only minor changes in this last year. The User Inquiry Form was extensively revised to reflect better the flow of information gathered by the assistant when a potential user calls for information or an appointment. This form is shown in Appendix F. Data on MEDLINE use are now kept more efficiently. Because of changes in the reporting responsibilities of the specialists as described earlier, lengthy write-ups about a session are submitted at the discretion of the specialist.

The pricing of services to users has undergone several changes. In March 1974, SDC's increase in connect hour rates and in off-line printout rates was passed along to users by raising by a like amount the appropriate components of MIT's announced rates to users. There was a lag of about a month between the effective date of SDC's change in rates, and the date by which MIT was able to prepare a new price list containing the increased rates. Another price list was generated in September 1974 which reflected the additional data bases the staff had been trained to search as well as the formal introduction of searches on Lockheed DIALOG in

addition to SDC. The September price list also heralded a change in the pricing algorithm for industrial and commercial users. The new algorithm charges such users at a rate 1.5 times the rates in effect for educational institution and government users. Effective also in September, all users were charged for the appointment length time of the information specialist; this charge previously had been waived for MIT users.

Major changes in pricing were again made in January 1975 and are reflected in the most recent price list as shown in Table 1. The latest changes have simplified the work of the staff, and are easier to present and interpret in a price list. Data bases reasonably similar in connect hour search rates are grouped. A single rate is established for each group taking into account estimated demand on individual data bases within the group, and estimated proportional use of SDC and Lockheed when their rates for the same data base differ. The telecommunication cost of $10 per hour and the MIT administrative surcharge of $16 per hour are both added to the group rates to determine the announced on-line search rate. The price list rates are reported per minute of on-line search time. Previously, rates were quoted per half-hour, and although stated as pro-rated, several users had thought the rates were a minimum base rate, that is, that you couldn't search for less than that charge. The rates for off-line printouts for each data base group were similarly derived. A $3 handling charge was instituted for off-line printouts sent from the Coordinator's office to any off-campus commercial address. Also effective January 1975, MIT decided to absorb the cost of the time spent by the information specialists in appointments with users.

The promotion of services continued to utilize most of the mechanisms initiated during phase one but several new mechanisms have since been added. Paid advertisements have been placed in The Tech, a campus community newspaper, whereas previously only articles had appeared in it. An information booth manned by the Coordinator and the information specialists was set up along a major corridor used daily by most students and many others at the Institute.

Table 1

PRICE LIST -EFFECTIVE 1/17/75

DATA BASE *	EDUCATIONAL USERS		COMMERCIAL USERS	
	On-line per minute	Off-line	On-line per minute	Off-line **
MEDLINE	$0.40	$0.10/pg.	$0.40	$0.10/pg.
CAIN ERIC INSPEC PSYCH ABSTRACTS	$1.20	$0.12/cit.	$1.80	$0.12/cit.
CA-CONDENSATES NTIS	$1.40	$0.12/cit.	$2.10	$0.12/cit.
GEO-REF INFORM SOCIAL SCISEARCH	$1.60	$0.20/cit.	$2.40	$0.20/cit.
COMPENDEX POLLUTION PREDICASTS SCISEARCH	$2.00	$0.20/cit.	$3.00	$0.20/cit.

* These prices refer to either Lockheed or SDC when the data base is covered by both systems. The choice of the system is up to the discretion of the Specialists.

** There is a $3.00 charge for postage and handling of any off-line printout going outside the M.I.T. campus.

Large, colorful posters were prepared and printed through MIT Design Services and hung on bulletin boards around the Institute. These posters have generated considerable attention and are so attractive that several keep "disappearing" from the bulletin boards.

Demonstrations continued to be one of the major promotion mechanisms. In this last year, the emphasis in demonstrations has changed from a strictly data base by data base approach to a broader orientation touching two to five data bases of interest to a group. The smaller the group the more individual and problem-oriented the demonstrations become. In any event, the demonstrations rely less and less on canned presentations. More and more random search topics are being taken from the audience as the specialists have gained in experience and become more comfortable in on-line extemporizing and handling problems arising during the demonstration. Several of the demonstrations held in recent months have been free of computer charges to MIT because of specific arrangements made by NASIC/Central with commercial search services for this type of promotion.

The MIT Libraries have recently allocated $500 toward implementing a minisearch as a "promotional teaser" to faculty and staff. Their topical interests are to be determined from research directories and other sources available at the Institute and a brief search on the topic is to be conducted. Printouts are to be sent along with a cover letter or a subsequent follow up visit by the information specialist who ran the search. This is a much more personalized promotional approach but it hasn't been fully implemented as yet.

Another mechanism to be tried in early March is an all-day "teach-in" for the data bases serviced. This is patterned after a successful similar "teach-in" done by the University of Rhode Island. The MIT specialists and staff from NASIC/Central will rotate in a continuous demonstration of the services available. There will be no charge to MIT for the computer

search costs because of the arrangements between NASIC/Central and the SDC and Lockheed services. Attendees will be asked to bring questions with them for sample searches and they will receive up to 5 minutes of search time. They will receive the terminal printout but offline printouts will not be generated. An Institute-wide mailing, posters, and an article for The Tech are being prepared to announce the teach-in. Refreshments will be available as an additional enticement.

More discussion on the importance of promotion appears later but it is noteworthy that until these services are well established, a sustained level of promotional activity is essential.

V. STATISTICAL CHARACTERIZATION OF USE OF NASIC AT MIT SERVICES

An analysis of the service operations is essential for understanding better the functions being performed, the needs of the user community, and as a basis for change. A statistical characterization of the use of the service is given in this section; user needs are also addressed in a subsequent secton on an analysis of user receptivity to services. The analysis here draws upon the data tabulated in Appendix G. Unless otherwise noted, all statistics refer to the period 1 March 1974 through 28 February 1975. Comparable data covering the initial period of service from 15 November 1973 through February 1974 may be found in the phase one report (1).

There were 316 searches conducted; approximately a third were on the MEDLINE data base. Almost all searches were on-line retrospective. Twelve on-line current awareness search entries have been made on an experimental basis (refer to page 4-5). No off-line searches were made (refer also to page 4-5). The use of MEDLINE remains high but has decreased from fifty percent of total use in phase one as more data bases have been added, and as the proportion of industrial users of the service has increased.

About ninety percent of all searches were by appointment with the user present with the information specialist, both acting as a search team. Tables G-10 through G-12 show only a few searches performed by the specialist in a delegated mode. The delegated searches were follow-up searches performed after an initial search by appointment with a user, or were some experimental on-line current awareness searches. A few of the searches for industrial personnel have been carried out with the specialist working with the company librarian.

Table G-1 shows the distribution of service by site. Half of the searches have been in the Science Library, primarily because their specialist staff are the only ones trained in using MEDLINE. The Barker Engineering Library specialist staff have performed an additional quarter of all searches, but have performed about 35 percent of all NASIC data base searches. No searches have been made as yet in a user's office or laboratory, although

some demonstrations (refer to section VII) have taken place away from the Libraries.

Tables G-2 through G-4 show a breakdown of users of each data base by their organization and status. Two-thirds of all searches were for MIT campus users, and about one-third were for industrial/commercial organization users. MIT has an extensive industrial liaison program and these services have been promoted to affiliated companies. A small proportion of users have come from other universities in the area.

A revealing item is that MIT campus use of data bases is 55 percent for NASIC data bases and 45 percent for MEDLINE, whereas industrial use is 80 percent for NASIC data bases and only 20 percent for MEDLINE. MEDLINE costs are relatively low because of government subsidies. Terminal connect time costs for the NASIC data bases run two to six times higher. Industrial users can afford the higher costs more than their academic brethren. On the other hand, the difference in use cannot be attributed entirely to cost differentials. There has been an increasing interest and funding for interdisciplinary medical and health-related research programs at MIT. The lower cost for MEDLINE makes the cost-effectiveness of a computer search more obvious to these researchers. There is a smaller differential between that cost and whatever personal cost-effective thresholds need to be overcome before people will utilize the service. Academic researchers in non-medical areas require more convincing, a task that bears heavily on promotional efforts.

Graduate student and faculty use of the service remains the dominant factor among the academic community. Undergraduate use is low; by and large, undergraduates do not have financial support resources to draw upon unless they are working with a faculty member. (Refer to the discussion in section VII on Undergraduate Research Opportunities (UROP)). It is an interesting anomaly that undergraduate use of MEDLINE, the least expensive data base, is considerably less than their use of NASIC data bases. A partial explanation, perhaps, is that the medical area has not yet infiltrated the MIT academic curriculum to the same degree that it has the research.

It is helpful to consider the number of MIT campus users by rank in relation to their proportion in the total MIT population. There are approximately 1200 faculty and other teaching staff members (excluding graduate student teaching assistants), 4000 graduate students, 4000 undergraduates, and about 1500 other administrative, academic, and research staff. Thus a slightly greater proportion of the total faculty (nearly 5 percent) have used the service than have the other segments of the MIT population. Although more graduate students have used the service than any other category of MIT users only 2.2 percent of this group conducted a search in the last year. Two percent of other staff and a half of one percent of the undergraduates used the service in this period.

About 15 percent of all searches have been on the social science and humanities oriented data bases, a proportion that holds for MIT-affiliated users as well as for industrial users.

Tables G-5 through G-7 show for each base, the distribution of MIT campus users by their department or laboratory. Almost all departments had at least one user. As might be expected, there is broader use of the non-medical data bases. Most of the use of MEDLINE (about sixty percent) has been concentrated in just two departments -- Nutrition and Food Science, and Biology. The largest use to date of the NASIC data bases has come from the Earth and Planetary Sciences and the Civil Engineering departments. The former has mainly used GEO-REF, the latter mainly NTIS, COMPENDEX and GEO-REF. The largest departments at the Institute, Electrical Engineering and Physics (together they represent about 30 percent of the Institute population), have made little use of the service to date. The INSPEC data bases which are prime resources for those departments, were not available at MIT until the Fall 1974, whereas COMPENDEX and GEO-REF had been available since the Spring 1974. This underscores significant time lags between the availability of a data base, the awareness of that service, and its actual use by the potential user community.

It is of interest to note that for the 18 out of 24 departments making use of the service, the median (50th percentile) number of data bases of interest to a department has been 3.5 with a range from 1 to 7 data bases. With addition of more data bases to the service and more users from any one department, we expect the average and the range to increase. It should be

obvious from this data alone, that there is an inherently large cross-fertilization of interests which cannot be characterized by the traditional names of departments. The range of interests is also characterized by the use of scientific-technological data bases by personnel from social science departments, and the use of social science data bases by scientific and technological department personnel. This is perhaps indicative of research trends in the application of technology to social and environmental problems.

MIT has a large number of specialized centers, laboratories, and programs; many of them cut across department lines. Use of services by these centers has been relatively small, but then much of the initial promotional effort was directed to departments and not to these specialized groups.

Table G-8 shows some of the publicity responses of MIT-affiliated users. Data has not been collected consistently from every user and therefore the table is only generally indicative of overall user response. Also, some users have reported more than one mechanism, while others may not have reported all the mechanisms with which they had contact. We felt that most of the data represents the source from which the respondent first heard of the service. The table contains no information about the promotional responses from inquirers who later may have become users. Despite these qualifications, some useful information can be gleaned from the table. We must make a very important distinction between promotion that makes people aware of the service and promotion that results in actual use of the service. Any one promotional mechanism has the potential for doing either.

By far the most frequent manner in which users reported that they heard of NASIC was from a colleague. Thus, the awareness function is doubly important because an individual who knows of the service may tell others about it even if he doen not use it himself. Thus, there is a cascading promotional effect.

At least thirty percent of the searches by MIT users have been repeat customers who typically search additional data bases, although a fair number have had more than one search problem. In either case, the high amount of repeat use is indicative of satisfied customers (see section VI). Presumably, our satisfied users have helped promote the service by telling their colleagues about it.

We know from experience that all publicity mechanisms have resulted in further inquiries about the service and that all mechanisms have resulted in generating at least some actual users. The data in Table G-8 support the experiences discussed later in Section VII that more personalized promotion of the service has a higher probability of generating users. Nevertheless, the less personal modes, such as posters, articles, and ads, promote an important general awareness and can't be ignored.

Table G-8 does not report on industrial user responses but demonstations have often been attended by corporate librarians who are then prepared to do some personal promotions within their own organization.

It is of interest to note the significant response from library staff referrals. There is a growing interaction between the traditional reference staff of the Libraries and the NASIC specialists. An ideal goal is to integrate the reference activities, whether manual or computer-based.

Faculty have responded more to direct mailings than to other mechanisms and this indicates that this method can be effective. Little or no mailings were made in this period to other groups, but we do know that several graduate student users heard about the service from their faculty advisors.

Table G-9 shows how users have elected to pay for the service. Most users have had access to funding sources such as contracts or grants and have paid by requisition. Most industrial users have paid by a purchase order from their company. It is of interest to note that about ten percent of the users have paid for the service with personal funds. However, 26 percent of the undergraduate users paid with personal funds and, if eight undergraduate users from a special seminar course are discounted, the percentage would rise to 45 percent. A fair number of graduate students (about 16 percent) have paid with personal funds.

The search sessions are characterized in detail in Tables G-13 through G-15.* The data in this table cover all searches held in the period 1 March 1974 through 30 November 1974. The average length of an appointment between user and information specialist was 57 minutes over all NASIC data bases and 65 minutes for MEDLINE searches. In both cases, a comparable percentage of that time was spent in an on-line connection to the retrieval

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* The data in Tables G-13 through G-15 were reduced from search session logs by Mr. Richard H. Rosenthal, a student at the Simmons College School of Library Science.

system (37 minutes or 65 percent of the time for NASIC bases and 41 minutes or 63 percent of the time for MEDLINE. This ratio tends to hold for most data bases, even when there are large differences in the absolute times spent on an on-line connection or at an appointment. There is only a weak inverse correlation between the absolute connect time averages and the cost rate of the connection. There is a much stronger and positive correlation between this time and the size and comprehensiveness of the data base being searched.

The time spent by the user with the specialist but not on-line is devoted to reviewing the problem, developing an initial strategy, and completing the billing data. The user problem statement discussed in section IV is the basis of much of the discussion that transpires between the specialist and user about the problem.

With the current state of communication links, 14 percent of the NASIC searches and 22 percent of MEDLINE searches had significant interference (adding to about 14 minutes) from machine problems. However, these percentages do not reflect several appointments that had to be rescheduled in entirety because of severe difficulties in establishing or maintaining a connection.

Less than half of the NASIC search sessions (43 percent), but 65 percent of MEDLINE searches, included one or more requests for an off-line printout. This ratio fluctuates greatly with the data base. A rather large number of citations per printout are obtained, about 173 over all NASIC bases. For MEDLINE, 60 pages of printout are typically requested with perhaps two or three citations appearing per page. Typically, printouts of only ten to twenty citations are obtained on-line. One reason that at least some users do not request off-line printouts is that no relevant material has turned up in the search process. Negative searches are not at all uncommon or unexpected among research-oriented users who are often simply seeking reassurance that no one else has done what they propose. The percentage of completely negative searches is about 15 percent.

While the characteristics discussed so far vary among data bases, the data for MEDLINE is not significantly different from the NASIC averages. In particular, it appears that once a user has decided to undertake a computer search, no matter what the data base, he or she is more concerned with parameters of search effectiveness other than cost.

The actual average charges to users are tabulated in Tables G-13 through G-15. The average actual charges for computer connect costs plus

administrative costs were $45.96 for NASIC data bases and $13.00 for MEDLINE. The average cost for the appointment time of the information specialist was $7.84 for NASIC and $8.81 for MEDLINE. This specialist time charge was forgiven to many users as explained in section IV. If an off-line printout was requested, the average cost was $20.75 for NASIC data bases and $5.84 for MEDLINE. The MEDLINE average printout cost is much lower because the basis of the charge is by page, not by citation. Thus average total actual charges were, with printout, $74.55 for NASIC bases and $27.65 for MEDLINE. Without off-line printout, the average total user charges were $53.80 for NASIC and $21.81 for MEDLINE.

The data base rates charged users have changed during the last year. In addition, the actual charges reported above reflect a mixture of users charged educational rates and those charged commercial rates. These complications have been partially removed by reporting an adjusted charge in Tables G-13 through G-15. The adjusted charge is based on MIT's educational user rates for each data base in effect during the Fall 1974. The actual average time data is used in calculating the adjusted charges. The adjusted charges include the MIT surcharge toward recovery of the library administrative overhead. By using the actual time data reported for each data base, the reader may calculate adjusted charges for each data base with whatever terminal connect time rate is most appropriate to the particular analysis. A similar technique can be used for off-line printout costs or for information specialist time costs.

Industrial users have been charged rates 1.5 times greater than educational users. Thus, the revenue generated by an industrial user, other factors being equal, is expected to be fifty percent greater. We have not fully derived supporting calculations, but there is some evidence suggesting that actual revenues from industrial users are running somewhat greater than 1.5 times that of academic users, perhaps as much as 1.7. Any number of factors, or combinations of factors, may account for this such as lengthier appointments, a higher ratio of connect time to appointment time, greater frequency and length of off-line printouts, or even a slightly greater proportional use of more expensive data bases than academic users. Regardless of the reasons, we can at least state that industrial users are less concerned about cost than other users and are readily willing to pay for services at rates fifty percent greater than for other classes of users.

VI. RECEPTIVITY TO SERVICES

A formal survey was conducted by questionnaire of all users of the NASIC service at MIT to determine their reactions to it and to identify areas for improvement. The questionnaire is shown in Table 2. It was sent, along with return envelopes, to 200 users of the service through December 1974; no follow-up requests were made. Any user who made more than one search received only one questionnaire. An unusually high 46 percent response rate (92 returns) was achieved and it suggests the strength of feeling toward the service by its users. Response data is tabulated in Tables 3 and 4. The total number of academic-user plus industrial-user respondents is less than the total of all respondents because some chose to remain anonymous and so we did not learn their status.

The results of the survey are most gratifying. Fully 91 percent of all respondents found the service satisfactory, and 50 percent found the service to be very satisfactory. Only 8 percent of respondents were unsatisfied with the service. More importantly, perhaps, 77 percent of all respondents found the service to be worth the charges; 14 percent thought it was not worth the charges and 9 percent had mixed responses. With respect to the citations obtained, 84 percent of all respondents thought the relevance to their initial search problem was moderate to high. Relevance was considered marginal by 12 percent of respondents, and nil by 3 percent.

An examination of Table 3 shows that these proportions hold when respondents are categorized as academic users or as industrial users. However, while more industrial users than academic users (84 percent to 74 percent) thought the service was worth the charges, the figure for academic users is much higher than we had expected.

Table 4 categorizes the academic respondents by their status as faculty, graduate student, undergraduate, and other staff. A number of variations show up here. Other staff, mainly researchers, are the most positive in their reactions to the service and its charges, being even more

Table 2

NASIC Coordinator's Office — Massachusetts Institute of Technology

NASIC SEARCH EVALUATION QUESTIONNAIRE

* NAME:
ADDRESS:
PHONE:

1. Have you found the NASIC Service to be satisfactory?

   _____ very satisfactory
   _____ generally satisfactory
   _____ not satisfactory

2. If you received a print-out, please indicate the citations' general relevance to your initial problem:

   _____ high relevance
   _____ moderate relevance
   _____ marginal relevance
   _____ no significant relevance

3. Have you found the service to be worth the charges? _____ yes _____ no.
   Please comment:

4. In what ways, if any, have you found the service less than satisfactory, and how would you suggest future service be improved?

5. Additional comments:

* Your comments are earnestly solicited and will be used to help analyze the utility of the concept of fee-for-service computerized literature searching at M.I.T. and elsewhere. You need not give your name and address if you so prefer. Thank you for your help.

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Table 3

OVERALL RECEPTIVITY TO NASIC AT MIT SERVICES BY USERS

	All Users		Academic Users		Industrial Users	
	Number	Percent	Number	Percent	Number	Percent
1. The NASIC Service was:						
– very satisfactory	46	50	25	50	10	53
– generally satisfactory	38	41	21	42	9	47
– not satisfactory	7	8	4	8	—	—
– (no reply)	1	1	—	—	—	—
2. The general relevance to my intial problem of the citations on the printout was:						
– high relevance	41	45	23	46	8	42
– moderate relevance	36	39	17	34	9	47
– marginal relevance	11	12	7	14	2	11
– no significant relevance	3	3	3	6	—	—
– (no reply)	1	1	—	—	—	—
3. Is the service worth the charges?						
– yes	71	77	37	74	16	84
– no	13	14	7	14	2	11
– (other response)	8	9	6	12	1	5

Table 4

RECEPTIVITY TO NASIC AT MIT SERVICES BY TYPE OF ACADEMIC USER

	Faculty		Graduate Students		Under-graduates		Other Staff	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
1. The NASIC Service was:								
– very satisfactory	9	50	8	42	1	25	7	78
– generally satisfactory	7	39	10	53	2	50	2	22
– not satisfactory	2	11	1	5	1	25	—	—
2. The general relevance to the initial problem of the citations on the printout was:								
– high relevance	10	55	8	42	—	—	5	56
– moderate relevance	4	22	8	42	2	50	4	44
– marginal relevance	3	17	2	11	1	25	—	—
– no significant relevance	1	6	1	5	1	25	—	—
3. Is the service worth the charges?								
– yes	14	78	13	68	1	25	9	100
– no	3	17	3	16	1	25	—	—
– (other response)	1	6	3	16	2	50	—	—

enthusiastic than industrial respondents. Faculty and graduate student respondents tend to represent the average of all academic respondents. Identifiable undergraduate respondents were least enthusiastic but that data is based upon a very small sample size of four. Students, graduate and undergraduate, had a somewhat greater mixed response to the worth of the charges than other academic respondents.

Questions four and five on the survey instrument called for free-form responses about improvement of future services, and other comments. Suggested topics for comment were not mentioned. At least one comment was made by 80 percent of the respondents, and many respondents offered several. Few people are neutral to this service. The comments and suggestions are summarized in Table 5 under broad headings with an indication of the number of respondents making similar comments.

The comments in Table 5 indicate a number of ways in which users see need for improvement. Work is progressing in several of these areas to further improve the service and the access to it. Nevertheless, a number of improvements are dependent upon data base publishers and commercial search service organizations. Even with improvement, an expanding quality service results in increasing sophistication of users who may offer still more constructive criticism as they see what can be done by a good system working well. But then, too, some users will always expect too much from the service, while still others are fooled into thinking the "giant brain" has done it all for them.

Cost continues to be of concern to users. The overwhelmingly positive response to the worth of the service is still separate from questions of where potential users obtain the wherewithall to pay for service. Additional information on charges was obtained from two other small, highly informal surveys.

We were concerned that the non-respondents to the formal survey might have had different reactions than the respondents. Consequently, we telephoned a random sample of ten users who we believed had not returned a questionnaire (with apologies to be extended in case they had returned

Table 5

FREE-FORM RESPONSES TO SEARCH EVALUATION QUESTIONNAIRE

Information Specialist Assistance

*3- Extremely pleased with the information specialist's performance with specific reference to her ability as being responsible for the success of the search.

2- I.S. (or a human intermediary) is a necessary or indispensable component of this kind of service (e.g. "The problem with bibliographic search software is that it simply isn't smart enough yet. As a result, an experienced human intermediary is required in order for the service to be of any use at all.")

4- Allow users to do their own searching (eliminate the I.S.) if they wish.

1- Displeased with performance of the I.S.

Service Operation

12- Found the service of value and specifically expressed satisfaction with their experience (e.g., "The service was excellent").

4- Too much red tape (e.g., user problem statement, scheduling difficulties, or general hold-ups) in getting an appointment.

1- Would like to have system available for quick look-up type questions.

3- Excessive on-line response time; other complaints about computer or terminal or Tymshare breakdowns and problems.

1- Suggest 24-hour service.

1- Need faster terminals.

1- An itemized statement of charges from the Accounting Office would be welcome.

---

* The number at the left indicates the number of respondents voicing similar comments.

Table 5 (Continued)

Cost of Service

5- Found the costs moderate and acceptable for the service obtained and time saved.

7- Search saved much valuable time; speed a definite benefit.

2- The concept of a fee-for-service computerized service is excellent and should "be made a permanent proposition".

1- MEDLINE search well worthwhile, but higher costs of other bases (specifically CHEMCON) caused user to hesitate using them.

5- Seach too expensive for results received.

1- User happy that down-time deducted from his bill.

1- Would like to have cheaper print-outs.

1- Costs should be on a computer-time, not a connect-time, basis.

1- Service should receive some revenue.

Retrieval of Information

12- Key word terminology not specific enough; language should be expanded; valuable time lost in formulating proper terms on-line.

9- Recognition on the part of user that his or her ability to clarify the subject or problem is sometimes responsible for failure or poor results of the search; need for user to be well-prepared and organized (e.g., "I am sure the value will improve as I learn how better to use the system").

12- In order to better plot strategy and plan input prior to search would like to have the opportunity to either (1) look up key words or subject headings in glossaries or thesauri, or (2) be given an expanded description of data base parameters and options, indexing criteria, and other program specifics; or (3) consult the staff to clarify and analyze the problem or be given enough examples of how the user interfaces with the specialist.

1- Comment that even negative information retrieved can be worthwhile.

5- Articles improperly classified or indexed.

2- No uniformity of language or publication coverage among data bases or systems.

Table 5 (Continued)

3- Publication coverage incomplete and spotty; exact date of entry could not be found.

5- Either retrieved no citations -- even ones known to exist -- or subsequently found several important references missed by the on-line search.

2- System retrieved obscure but highly useful documents which otherwise probably would have been overlooked.

2- Search gave too many irrelevant documents (false drops).

9- Expand the number of data bases NASIC offers; present file size too small to be useful.

2- Too many typographical errors in print-out.

4- Had severe problems in getting hard copies of documents retrieved; service should also help you obtain the full texts.

it anonymously). Only seven of the ten were reachable, the other three being two graduate students and one faculty member who had left the Institute. (More will be said about population turnover later.)

The two industrial users sampled both said the service was very satisfactory and worth the charges, and that the citations had high relevance to their problem. The five academic users comprised three faculty, one graduate student, and one research associate. Four of the five felt that the service was worth the charge, that the service was generally to very satisfactory, and generally, that the citations were of moderate relevance. The two faculty members thought the citations obtained were of marginal or no relevance. Thus, these reactions by a small sample of non-respondents support the overall results of the questionnaire.

A second, small, informal survey was made of non-users of the service. Ten persons were contacted, of whom half were faculty and half from research staff. Seven had heard of NASIC but two or three of those were somewhat fuzzy about the details. Three had not heard of NASIC; these three were characterized by having been at MIT only a relatively short time: 3 to 6 months. Additional explanation of NASIC was given to the 5 or 6 who had not heard of NASIC or were not sure of what it was. All 10 were then queried about their possible use of NASIC.

All 10 expressed some interest in using NASIC in the future. The degree of interest ranged fairly uniformly from a very mild "I might look into that sometime" to "that is just what I need, send me the application forms". The non-use by those who had heard of NASIC seemed to have several bases: several respondents indicated they hadn't had a need for searching -- some of those indicated they never did much reference work but most expressed a future need was likely; three respondents specifically mentioned cost as a deterrent and two indicated the much stronger likelihood of using the service at the subsidized MEDLINE rates; several respondents indicated that they weren't sufficiently aware

of the benefits to be derived from computerized searches; one respondent had attended a NASIC demo that "bombed" and was "hopefully waiting for the system to be perfected". There were, of course, combinations of these themes also: e.g., "I wanted to do a search before but didn't have access to funds, now I have funds but don't need a search".

Our conclusions on user receptivity to computerized literature searching based on our general NASIC experience and several surveys of both users and non users of the service are very positive and may be summarized as follows: Over 80% of users are favorably disposed to the quality and cost effectiveness of the service and either have used or plan to use the service more than once. Practically all non users are potential users under the proper circumstances. Cost is a major factor although most faculty, staff, and graduate student researchers do have access to funds they can use; cost is much less of a deterrent to industrial users who use the services much more intensively than their academic brethren. Publicity efforts need to be very intense, even considerably more than the fairly intense M.I.T. efforts to date; potential users need to not only hear about the service but also be shown its cost effectiveness (as actual users find out). The general computerized search service and the retrieval systems in particular could be improved in many ways to further improve cost effectiveness; some of the needed improvements are: better reliability; more comprehensive data bases; more comprehensive indexing; more uniformity among data bases and systems; greater simplicity of use so that some users can do their own searching; and easier access to the full text of the documents.

VII. COMPARATIVE EVALUATION OF PROMOTIONAL TECHNIQUES

The NASIC at MIT Service has attempted a number of promotional techniques throughout the two phases of program. Experimentation has shown that the more personalized the publicity effort, the greater the chance of "capturing" the prospective user: that is, the more the prospective user can relate the potential of this service to his or her own research, the greater the chance that the person will become an actual user. The following is a comparative analysis of the various techniques utilized from NASIC's inception to the present, some of which have been briefly commented upon earlier in this report. The discussion is not chronological.

Arguments in Support of Cost Effectiveness of NASIC Services

In most cases, cost to the user for services is a large factor in his or her initial decision to try this service, especially because it is a new untried capability. Prospective users who, generally, are enthusiastic still frequently hesitate because of the search fees. Therefore, one of the chief objectives of all promotional activity has been to overcome the reluctance of people to use the system because of costs. This has been done by pointing out the various advantages of machine searching, including its cost effectiveness (which is not necessarily obvious to a prospective user), stressing the following points (excerpted from a handout called "Some Information About M.I.T.'s Search Service...").

Cost Effectiveness to the User

Although the fee for service initially appears high, the true user cost is kept lower than manual search costs, because a search is completed in far less time, e.g., a machine can retrieve and subsequently print-out 200-300 citations in a minute or two, while an equivalent manual search could take days or weeks. If the searcher's time and subscription cost for the index are factored in, the cost per manual search actually far exceeds that of the computer search.

Greater Specificity and Thoroughness

By use of AND, OR, and AND NOT Boolean logic, retrieval can be limited to only relevant material. Boolean logic allows greater search flexibility than printed indexes (e.g., in one command to the computer, you can request a combined search by author, year, subject, preferred language and type of publication, and immediately pull all documents meeting these exact specifications). In a manual search one cannot easily intersect concepts in this way, especially for large lists of retrieved documents.

Eliminates Writer's Cramp

A printed bibliography, ready for use, is produced at the terminal or mailed off-line, eliminating the need to copy down citations, keep a card file, etc.

Greater Accessibility

Data bases generally have many more retrieval access points per citation than printed idexes because of enriched indexing. Printed indexes generally reference a document under only one or two descriptors.

Eliminates Searching Cumulative Indexes

Because the information in a data base is interfiled and searched simultaneously, the need for searching annual, quarterly, monthly, and weekly issues of a publication is eliminated. At the same time, however, the computer can limit a search to a particular year or issue of the file if so specified.

Customized Output

User participation in the on-line interaction ensures retrieval of the most useful material to that researcher. In addition, users generally can choose the format of their retrieval print-out, specifying titles, authors, sources, abstracts or any combination of the categories of information available to a particular data base. For some files, citations can also be sorted chronologically, from the most recent to the older references, or by hits (i.e., those matching the search statement most closely are printed first). With some bases, users also have the option of specifying an expanded or compact print-out:

Indented Format:

TITLE NONLINEAR ABSORPTION AND HEATING OF DENSE PLASMAS
AUTHORS RODERICK, NORMAN F.

Compact Format:

AU-RODERICK, NORMAN F.
TI-NONLINEAR ABSORPTION AND HEATING OF DENSE PLASMAS

Cost Ceilings

The user can limit the cost of search to some maximum dollar amount, but this may be at the expense of a less complete search.

Customized Service

The user is getting undivided attention and service from a professional information specialist, a very valuable service. The specialist can guide the user in surmounting barriers to traditional library service as well.

Alerting Mechanisms

There is a difference between simply making potential users aware of the existence of NASIC and actually inducing them to use the service. As stated before, the more personalized the publicity, the more likely the individual is to make an appointment. These active, personalized methods, (such as demonstrations) require greater amounts of time, money, and effort, however, than the passive publicity modes such as mailings, ads, brochure displays, and posters which are the primary means to alert people to the service's availability.

The NASIC search sites in each library are designed to aid the alerting function. Each of these NASIC sites is colorful, with bold lettering that stands out from the rest of the library environment. Actual appointments, as well as demonstrations, take place in these areas, which help to reinforce the existence of a computerized search service at M.I.T. Bright orange and pink posters announcing "Hassle-Free Research" of the literature are on display throughout the libraries, as well as the rest of the Institute. Brochure display racks are available near the information desks at each location, and signs reading "This index can also be searched by computer" are placed in the reference collection near each printed equivalent of NASIC data bases. In the Barker Engineering

Library, the audio-visual teaching cassettes for Engineering Index and Chemical Abstracts briefly mention the on-line versions of these services. The effectiveness of all of this library-related publicity, however, depends upon the frequency of use of the libraries and the individual potential user's interest and diligence in actively following up these passive alerting devices.

Demonstrations

Demonstrations were among the earliest and are still the most frequently used publicity mechanisms, although their emphasis and format have altered with time and experience. In the beginning, demonstrations were rather formal, "canned" presentations designed to highlight particular elements of a data base or bases, as well as to demonstrate the conceptual processes of an on-line literature search. These "canned" demos were carefully worked out in advance to illustrate how a particular search (e.g., tar and nicotine in cigarettes) could be developed by creating "lists" through searching and then combining these lists by Boolean logic to expand or refine the results, while at the same time utilizing the unique features of the specific base being demonstrated. Both the NASIC Coordinator, who usually described what was happening at the terminal to the audience and the information specialist, who actually keyed in the terms, had copies of this "script", and synchronized the demonstration accordingly. These formalized presentations were felt to provide a thorough introduction to the capabilities of on-line searching while avoiding such potential pitfalls of less structured or extemporaneous demonstrations as retrieving zero documents on a user-specified term. A "library" of these search examples developed and were drawn upon for many demonstrations during this early period.

Initially, only one or two bases were featured at a given time, because of the fewer number of files then available, and the pure subject, or discipline-oriented approach which characterized all promotion at that time. The demos were advertised by featured data base, which, in retrospect, probably limited the number of potential users reached. Appointments with real users have since shown that, for example, a researcher in the Nutrition Department may find the engineering, chemical, or medical data bases more related to his or her current needs than the subject-specific CAIN file, which particularly features food science and nutrition.

As time progressed and the number of data bases expanded, and the information specialists became seasoned in searching and in dealing with the vagaries of computer access, the demos increasingly became more inclusive in their scope and more free-form in style with the emphasis shifting to extemporaneous retrieval; for example, the specialist would sample various bases in response to questions from the audience. With 14 data bases to choose from demos now reflect the interdisciplinary and problem-oriented nature of research, and are accordingly publicized. Emphasis is now on broader categories of information (e.g., pollution, energy, environment) that cut across specific data bases, rather than on individual disciplines (e.g., geology, engineering, chemistry).

These more individualized and spontaneous demos have had a much greater degree of impact on the user community. As soon as the system retrieves something germane to one member of the audience, the enthusiasm is instantaneous and electric, having a considerable effect on the rest of the on-lookers. At a demo of the GEO-REF data base, held at the Lindgren Library, a professor who had requested a particular search, literally tore his output from the machine exclaiming, "This is exactly what I've been looking for!" and rushed off to his secretary with one of the references to be added to the bibliography of a paper being typed for presentation later in the week.

Since the addition of the two data bases offering citation retrieval, the information specialists have exploited the special personal appeal of these files. When all else fails, the surest way to snatch promotional victory from the jaws of defeat is to produce an impressive list of authors citing a faculty member in the audience. Of course, the opposite effect could occur if he has not been cited. In short, personalized promotion is important to win friends and influence people for this kind of service.

Most demonstrations have been held in the divisional libraries rather than in labs or departments, partly because of the dearth of this type of request, but also because of the difficulty in transporting the terminals, which are still only nominally "portable". One departmental demo which was held after hauling the terminal by library truck through seeming miles of

underground tunnels, ended in an embarrassing output of gibberish, due to noise on the telephone lines into that particular site. This experience graphically illustrated the prudency of testing out connections in unknown locations prior to an actual demonstration; unfortunately, such testing may not be practical because of the distances involved, staff limitations, or limitations on the number of terminals available.

Demos have been advertised in a number of ways, from departmental mailings (see Appendix H) to announcements in the calendar of events section of the Institute newspaper and in library bulletins. Attendance at these demos have ranged from 8 to 40 or more. Generally no more than 12 can be comfortably accomodated around a terminal at one time.

Several demonstrations were held each month through October 1974. Starting in November demonstrations were held in conjunction with NASIC/ Central who had arranged to obtain free computer time for this purpose from SDC and Lockheed. The number of demonstrations held in this mode were less than were held up to that point because the necessary arrangements required tended to limit frequency and flexibility in scheduling. Of course, this is just one more illustration of the difficult trade-offs involved in attempting to utilize all the promotional techniques that are required to inform the potential user while trying to keep within the total staff and money resources available.

The largest single NASIC demonstration was held just after the conclusion of the contract period on March 13th, and is described below (see Information Bazaar). Another series of demonstrations will be held March 25th as part of the Industrial Liaison Program for commercial users of M.I.T. services. The full impact of both these large-scale demonstrations on the NASIC service is yet to be felt as of this writing.

Colleague Referral

Another significant promotional device is that of colleague recommendation or referral. It is obvious from the large number of appointments and inquiries resulting from personal referrals, that a satisfied user can be a very important ally in publicity to peers, to superiors, and to subordinates. For example, a member of the Center for Advanced Engineering Studies who ran

a search on audio-visual teaching equipment first used the resulting bibliography to write a grant proposal and then xeroxed and circulated it to the rest of the members of the center. As with demos, good experiences tend to reinforce the service, while negative ones undoubtedly detract from it. Word of mouth has other limitations because of the high level of turn-over at the Institute. If only one person in a department has had a search and leaves soon thereafter, the enthusiasm, and even awareness about the service can be lost to the rest of the group in a short period. On the other hand, as these services become increasingly available at other institutions, we may begin to see newcomers to the Institute who already have experienced this type of service elsewhere.

The Lindgren Library Experience

The Lindgren Library, which is housed in the same building as the rest of the Earth and Planetary Sciences Department, has been extremely useful in learning abou the motivation of people to use the NASIC Service. Almost by default, because of its physical separation from the rest of the M.I.T. campus, demos in this location have followed departmental interests rather than data base lines. That is, instead of advertising a demonstration of a particular data base such as CHEMCON, and expecting all M.I.T. people interested in Chemistry to be drawn by subject interest (as has been the case for demonstrations in other libraries), all publicity efforts at the Lindgren Library have been oriented to the department itself. Talks, as well as demos held here, have emphasized the variety of data bases containing information on geology as well as related fields, such as oceanography and meteorology. The Lindgren Librarian, who is also an information specialist, maintains a particularly close relationship with her department and has arranged well-attended seminars and demonstrations. The GEO-REF base is particularly relevant for the research interests of this group. A faculty search committee member used this base several times to locate published papers of candidates. It is interesting to note that the Department of Earth & Planetary Sciences has been the first at M.I.T. to negotiate a line item for NASIC searching in their next year's budget. Extrapolating from this experience, all demonstrations in other libraries now draw upon the variety of data bases of possible interest to a particular group or department.

Information Booth

An Information Booth staffed by rotating information specialists and the NASIC Coordinator, has been held several days per month as a promotional alternate to the demonstrations. The booth was set up in one of M.I.T.'s major corridors, where various Institute events are publicized, during peak hours of mobility. Custom-designed colorful posters, blow-ups of a sample search result, and a large sign on a stand proclaiming "Computer-Aided Literature Searching Information Here" have attracted many of the passers-by who made inquiries, took brochures, put their names on mailing lists for further information, and generally became acquainted with the fact of NASIC's existence. A very large percent of inquirers were undergraduates who as yet had no specified literature need, but were very interested in the concept of machine searching. After each of these sessions, as with the demonstrations, a number of appointments usually resulted.

UROP

At the Information Booth, at demonstrations, and through inquiries made at the Coordinator's Office, it became apparent that more undergraduates would have undertaken searches if funds were available to them. Through the NASIC Coordinator and the Adminstrative Officer of the Undergraduate Research Opportunities Program (UROP), an arrangement was made whereby undergraduates needing a literature search may apply for subsidy by applying to their faculty advisor. The Coordinator will write a brief description of the NASIC Service and this funding arrangement for the next annual UROP bulletin, which every undergraduate receives upon matriculation. In this way it is hoped that some undergraduates, at least will have access to the NASIC Service, communicate this information to their peers, and help to expose the need to find additional means of support for this segment of the academic community so that they can take advantage of the new tool of computerized literature searching early in their academic careers.

Newspaper Articles, Library Newsletters, and Paid Advertisements

The major value of these mechanisms is as an alerting mechanism to the service. Several articles on NASIC have appeared in The Tech, an undergraduate newspaper, and Tech Talk, a newspaper oriented to the entire Institute community which is heavily read. In all cases, interviews with a staff writer

were arranged and information supplied. Several articles a year are necessary to keep the srrvice before the eye of the M.I.T. community and update the information about it. The most recent article in Tech Talk announced the Information Bazaar, briefly reviewed the service, and mentioned some of the bases which had been added since the last mention of NASIC. Forthcoming demonstrations and other activities are also announced in the Calendar of Events section of Tech Talk. Paid advertisements of about $30-$40 each (see Appendix H) in The Tech have resulted in a flurry of interest and appointments after each issue. Library newsletters/acquisitions bulletins which are sent to a selective mailing list -- all potential NASIC users -- carry periodic cover articles on new data bases, demonstrations and other activities. The Barker Engineering Library Bulletin, for example, recently ran an article on all the NASIC data bases containing information on pollution. It is reproduced in Appendix H. Other departmental newsletters, such as Cross Talk, a periodic publication of the Electrical Engineering Department, have actively solicited articles on the NASIC Service.

Talks, Seminars, and Person-to-Person Contacts

Several information specialists have given seminars to interest groups in M.I.T. departments or to classes. Appointments have always followed these presentations. Several of the specialists maintain close contact with faculty advisors who provide excellent entrees into their respective departments. The Coordinator's Office has dealt with many visitors and inquiries by phone, by letter, and in person. In small group and one-on-one situations, there is much greater opportunity to discuss the service on a personal level and go beyond merely alerting people to its existence.

MITV Spot

One of the more unique pieces of publicity this year came in the form of a short filmed interview with the NASIC Coordinator by a member of M.I.T.'s undergraduate television news program (MITV), which is aired every Friday to the Institute community. An accompanying piece of footage, a search demonstration and explanation by specialist Ann Longfellow, was unfortunately cut, leaving only the brief verbal description of the NASIC Service. This media approach is primarily an alerting mechanism. A full length program might offer the potential to go beyond that level.

Mini-Searches

A formerly untried promotional effort, still in its early stages, is the mini-search. A maximum of $500 has been allocated by the M.I.T. Libraries to fund mini- (no more than 5-8 minutes) searches on research interests, as described in departmental publications and other sources, of selected faculty members. The resulting print-out will be forwarded in person by the information specialist who conducted the search, or by the Coordinator who will be given the information. It will be pointed out to the faculty member that the print-out represents only a small fraction of what a sophisticated search could yield. To date only a few of these have been run and no faculty member has as yet been contacted. Mini-searches will be done at the discretion and time of the individual specialists. The use of MEDLINE will be accentuated for the mini-searches to optimize the benefits from available funds. The Head of the Barker Engineering Library has provided the NASIC Service with a list of federally-funded research proposal summaries from respective departments in the School of Engineering which will be used in this experiment. Some examples, which again illustrate the cross-disciplinary interests within even one department (in this case Mechanical Engineering), are as follows: pressure distribution across human hip joint; superconducting electrical machines for ship propulsion; ultrasonic hyperthermia for tumor therapy; heat transfer characteristics of living biomaterials; and noise propagation into urban areas.

Experience gained through the recent individualized demonstrations suggests that this highly personalized technique will have good results. Individuals contacted will see the actual output of a search conducted on terms at least reasonably close to their area of research; we believe such a presentation is the next-best-thing to actually interacting with the system. Having the specialist who has actually run the search available in person for questions about the search itself, about other appropriate data bases for the researcher's interests and about the service in general, should be more satisfactory to the potential user than merely reading a mailing or reading brochures picked up in the libraries. In some ways this person-to-person discussion may even be more satisfactory than a demonstration, where people must take their turns having questions input to the computer, and no matter how small the group, cannot monopolize the information specialist.

Information Bazaar

The most recent, and potentiallly most important, single piece of marketing activity for the NASIC Service was an all-day, Institute-wide open house or teach-in/demonstration, held March 13th. This Information Bazaar, as it was publicized, was in many ways the capstone of all promotional efforts to date, and despite the fact that it occurred after the end of M.I.T.'s contract, deserves mention. All 14 data bases were demonstrated during specified blocks of time throughout the day. Publicity for the Bazaar mentioned that NASIC would attempt to give all visitors at least 5 minutes of free computer time to experiment with the data base of his or her choice. In fact, not everyone who came had that opportunity because of the overwhelming responses. Attendance was estimated at 300-400 people.

The Bazaar was held in the Map Room just off the Science Library. A special telephone line was installed for the main terminal which was placed in the middle of the room. Another terminal was located nearby at the Science Library search site where appointments are normally held. Both were in use the entire day, from 9:30 to 5:30, with information specialists rotating during each time segment. The specialists took each 5 minute question as it came, changing from file to file as was appropriate for each request in an extemporaneous fashion. It was explained to users that 5 minutes could not produce a full-fledged bibliography and that the time was only meant to provide a very general introduction to the mechanisms by which computers retrieve literature. Nevertheless, many brief but relevant mini-bibliographies were produced during the day, which seemed to whet the appetites of those fortunate to get on-line as well as on-lookers. A large table of general information on the NASIC Service was located near the entrance to the Bazaar, and sample on-line and off-line print-outs, user aids, and printed equivalents of many of the data bases were located in an area near the main terminal. Information specialists who were not searching, the NASIC Coordinator, the Coordinator's Assistant, and a representative from NASIC/Central circulated among the visitors throughout the day, explaining the service, dispensing information, and directing people who brought sample questions to the terminals. Users who wished to arrange smaller, more personalized demonstrations for a research group or department were encouraged to add their names to a sign-up sheet. About 57 visitors made this request.

The "fall-out" from the Bazaar was considerable. The day after the event, 9 people made appointments, and less than a week later (as of this writing) some additional 10-15 others also made appointments and there have been numerous phone calls and serious inquiries.

As with all demonstrations since October, 1974, NASIC/Central provided both computer time and staff assistance. Don Morrison, NASIC's Assistant Director, was present for the entire day. The M.I.T. Libraries made funds available for the various kinds of publicity, which included the printing and distribution of 300 large posters advertising the Bazaar, a feature article and a listing under the "Special Events" calendar section of Tech Talk, and an ad in The Tech, (see Appendix H), and an Institute mailing to over 6,000 faculty members, graduate students, and administrative staff (see Appendix I).

There are probably several reasons for the large turn-out and general success of this event. First of all, the mailing, which included both a brief description of the service itself and the data bases offered, went to a large portion of the M.I.T. community. Previous general mailings had gone only to faculty and some graduate students, and brochures advertising new bases had been sent according to departmental interests, thus missing many potential users in other departments with interdisciplinary interests. Also, because of the large turn-over of personnel at M.I.T., many people who had not known about NASIC became aware of the service for the first time. This suggests that a large general mailing should be done at least twice a year, both to keep the current service (with all newly added data bases) in front of the eyes of potential users, and to alert new members of the M.I.T. community to its existence.

Secondly, the service now consists of 14 data bases, which means that most areas of research at M.I.T. are now covered and that NASIC has more to entice people than in the past. Also, because the service developed so quickly during the past year with the addition of the Lockheed System and other data bases, there had been no general mailing advertising the availability of these newer files.

Finally, the Bazaar's success is probably due in large part to the accessibility of so much free computer time. This gave people who had been aware of NASIC 's existence and vaguely interested in using it "someday" an opportunity to try out the system without having to pay for it. For a number

of subsequent users, having seen output from the system personally oriented to their current interest was enough to convince them of the effectiveness of undertaking a full-scale search. With a service that operates on a fee-for-service basis, it is very important that the prospective user see in a personal way what can be reasonably expected to result from a search.

Conclusion

Publicity efforts to acquaint people with and encourage the use of computerized literature searching must be intensive, varied, and continuous. This is a library service unlike those which people are used to; it therefore requires considerable education of potential users to demonstrate the benefits of machine retrieval. Because of the cost factor, emphasis must be placed on the cost effectiveness of the service. It is obvious from various promotional techniques attempted that people respond best to publicity which is individualized and personally relevant. When publicity is effective, as in the case of the Lindgren Library, users are extremely receptive to this kind of service. As a professor from the Earth Science Department said: "We hope to make NASIC as familiar a tool as the xerox machine." Until all M.I.T. people reach that level of acceptance and enthusiasm, much more exhaustive promotion of the NASIC Service will be required.

VIII. REFERENCES

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Appendix A

PROJECT PERSONNEL

Electronic Systems Laboratory

Professor J. Francis Reintjes
Mr. Alan R. Benenfeld
Mr. Richard S. Marcus

The MIT Libraries

*Miss Natalie N. Nicholson
Ms. Marjorie Chryssostomidis
*Mr. Edgar W. Davy
*Ms. Margaret E. DePopolo
*Mr. William J. Duggan
*Ms. Ann M. DeVilliers
*Ms. Christine L. Franchi
Mrs. Patricia T. Gordon
*Ms. Irma Y. Johnson
*Mr. James M. Kyed
*Ms. Irene S. Laursen
Ms. Ann S. Longfellow
Ms. Hedy Mattson
*Ms. Diane E. McLaughlin
*Ms. Margaret A. Otto
Ms. Mary E. Pensyl
Mr. Philip W. Piper
*Mr. Peter R. Scott
Mrs. Jacqueline Stymfal
*Mrs. Frances B. B. Sumner
Ms. Nancy G. Vaupel
Ms. Susan E. Woodford

Information Processing Services

*Mr. Robert H. Scott

---

* Personnel marked by asterisk were 100% supported by M.I.T.

Appendix B

GENERAL OUTLINE OF TOPICS DRAWN UPON FOR NASIC WORKSHOPS

The specific topics and their order and depth varied with the workshops.

I. Introduction

- A. Introduction of Participants
- B. Plan of Workshop
- C. NASIC Goals, Plans, Participating Institutions
- D. NASIC Service Retrieval Systems, Data Bases, and the Communications Network
- E. Emphasis on Service
- F. Relationship of Computer Services and Traditional Library Services

II. General Concepts Fundamental to Searching

- A. Introduction and Annotated Citations to Suggested Background Readings
- B. Boolean Logic (simple level)
- C. Vocabulary, Vocabulary Control and Vocabulary Aids, in Indexing and Searching
- D. Concept of a List and Boolean Operations on Lists
- E. Strings and Truncation

III. Analysis of the Search Problem

- A. Conceptual Strategy Development
- B. Implementation of Conceptual Strategy on System(s) and Data Base(s)
- C. Feedback and Modifications of Strategy
- D. Cold Search
- E. Practice Search Problem Analysis

IV. Search Performance

- A. Recall and Precision
- B. Response Time
- C. System Performance or Specific Search Performance
- D. Search Failures
- E. Improving Recall Performance

F. Improving Precision Performance

G. Feedback

H. Factors Affecting Relevance Judgements and Recall

V. The User and the System

A. Partnership Between User and Information Specialist

B. Problem Statement

C. User Interview Preceding and During Search Session

D. User Satisfaction

VI. Framework for Studying Retrieval Systems and Data Bases

A. Introduction

B. Data Base Issued by a Publisher/Supplier

C. Data Bases as Implemented on Retrieval Systems

D. Retrieval Systems

E. Command Language Structures

VII. Communications Network

A. Components

B. Types of Telephone Connections

C. Terminals

D. Connection Protocols

E. Connection Troubleshooting

VIII. Demonstration Search

A. Step-by-Step Outline

B. On-line Practice

IX. Retrieval System (for each system)

A. General Features

B. Basic Search and Logic Commands and Messages

C. Basic Printout Commands and Messages

D. System Communications Procedures, Commands and Messages

E. Special Searching Commands and Messages

F. Special Output Commands and Messages

G. Other System Commands and Messages

H. Pitfalls and Problems

X. Data Base (for each data base)

A. Overview of the printed version

B. Overview of the machine-readable version

C. Unit catalog records, with comparison among versions

D. Searchable data elements and conventions, with comparison among versions

E. User search aids

F. Indexing philosophies of the data base

G. Detailed Search Examples

H. Pitfalls and Problems in Searching the Data Base

XI. On-Line Practice Exercises (Structured and Unstructured)

A. Retrieval System(s)

B. Data Base(s)

XII. Discussions and Reviews

Appendix C

MIT STAFF PRESENTATIONS AT NASIC WORKSHOPS

Topic	Staff Member	Workshop
Overview of General Concepts Fundamental to Searching	A. R. Benenfeld	IA, IIA, IIB
Analysis of the Search Problem	A. R. Benenfeld	IA
Search Performance	A. R. Benenfeld	IA
The User and the System	A. R. Benenfeld	IA
Framework for Studying Retrieval Systems and Data Bases	A. R. Benenfeld	IA, IIA, IIB
Communications Network	A. R. Benenfeld	IA
Search Demonstration	M. E. Pensyl	IA
CA-Condensates Data Base and Sample Searches	M. E. Pensyl	IA, IIA
ERIC Data Base and Sample Searches	N. G. Vaupel	IA, IIB
Review of ORBIT Retrieval System	A. R. Benenfeld	IB
COMPENDEX Data Base and Sample Searches	M. Chryssostomidis	IB, IIA
CAIN Data Base and Sample Searches	A. S. Longfellow	IB, IIA
INFORM Data Base and Sample Searches	J. Stymfal	IB, IIB
GEO-REF Data Base and Sample Searches	H. Mattson	IB
Predicasts Data Base and Sample Searches	J. Stymfal	IIB

Appendix D

FRAMEWORK FOR STUDYING RETRIEVAL SYSTEMS AND DATA BASES

A. Introduction

1. Approach to continuing self-study and use as a check-list
2. Channels of production and distribution of information products and services
3. Distinctions between data base issued by original supplier in printed or tape form and implementations on different computer-based retrieval systems
4. Distinctions between different retrieval systems
5. Distinctions between indexes to records and the records themselves
6. Complementary features of different systems or different data base versions

B. Data Base Issued by a Publisher/Supplier

1. General characteristics, size, frequency, history
2. Source publications coverage
3. Subject coverage
4. Abstracting policies
5. Indexing
   a. Types of indexes
   b. Frequency
   c. Cumulations
   d. Indexing policies
   e. Vocabulary control
   f. Organization of indexes
   g. Organization of thesauri
   h. Other search aids
6. Catalog record elements
   a. Data elements and descriptions
   b. Entry and format policies
   c. Coded data translations
7. Characters
   a. Character set
   b. Abbreviations

8. Documentation
    a. Manuals
    b. Index aids
    c. Search aids
    d. Newsletters
    e. Reviews

C. Data Bases as Implemented on Retrieval Systems
    1. Refer to B above
    2. Indexes to this system version of data base
        a. Differences between using these indexes and using indexes to other versions
    3. Data elements in this system version
        a. Elements added, subtracted, or combined
        b. Changes in format

D. Retrieval Systems
    1. Documentation
        a. User manuals
        b. Newsletters
        c. Other
    2. System tutorial
    3. System connection
        a. Methods
        b. Acceptable terminals
        c. Terminal settings
        d. Connection protocols
        e. Connection troubleshooting
        f. Message transmission process
        g. Typographical error correction
        h. System processing interruption
        i. System disconnection recovery
        j. Log-off
    4. System/User dialog
        a. Versions of dialog for system (Messages)
        b. Versions of dialog for user

c. Response cue for system (Message transmission)

d. Response cue for user

5. System Commands

a. Command categories

b. Command labels

c. Command formats

d. Operators used with commands

e. Default commands and arguments

f. Command options

g. Concentration of commands

h. Order of processing commands and arguments

i. Renaming capabilities

6. System messages

a. Descriptions

b. User response options

7. Search/retrieval

a. Logic

b. Nesting and/or precedence order

c. Matching criteria for index searches

d. Matching criteria for catalog record searches

e. Strings

f. Truncation

g. Search strategy history display

h. Search strategy storage between sessions

i. SDI features

8. User generated lists

a. Labelling by system

b. Labelling by user

c. List saving capabilities during search session

d. List storage between search sessions

9. System printouts

a. Media

b. Format

c. Inclusion of search strategy data

10. Characters
    a. Character set
    b. Abbreviations

E. Command Language Structures

1. User's message line to the system in three segments
    a. Command, or action, segment
    b. Argument, or object of action, segment
    c. Transmission setment
2. Command segment
    a. Command labels
    b. Command types
3. Argument segment
    a. Argument format and order
    b. Operators within arguments
    c. Absence of arguments
4. Default commands and arguments
5. Concatenation of commands on one line
6. User response to system questions similar to argument segment

Appendix E

OUTLINE OF INFORMATION CONTAINED IN THE DATA BASE MANUALS
PREPARED BY THE MIT INFORMATION SPECIALISTS

1. General Information

1.1 Data Base Tape Name

1.2 Organization Contact

1.3 Printed Version Name(s)

1.4 Retrieval Services Marketing Data Base

- 1.4.1 Online Services
- 1.4.2 Offline Services

1.5 General Description of Data Base

1.6 Size of Tape Data Base (Number of Records)
Latest Year; Cumulative; Growth Rate

1.7 Data Base History

- 1.7.1 Printed Version Began
- 1.7.2 Printed Version Current Frequency
- 1.7.3 Printed Version Current Index Types and Their Frequency
- 1.7.4 Printed Version Current Index Cumulations
- 1.7.5 Tape Version Began
- 1.7.6 Current Tape Frequency

1.8 Articles Reviewing the Data Base

1.9 References Used in Compiling this Report

2. Publications Coverage

2.1 Mix of Publications Covered (Type, Proportion, Frequency)

2.2 Publications Coverage Policy

2.3 Differences Between Data Base Tape and Printed Version in Publications Covered

2.4 List of Source Publications Covered (Including Frequency and Comprehensiveness of Coverage)

2.5 Inclusion in List of Coden or Other Journal Name Abbreviations

2.6 Availability and Cost of Hard Copy or Microforms of Any Documents Covered from the Data Base Supplier

2.7 Presence in the Printed Version or its Indexes of Titles and Other Terminology in a Foreign Language

3. Subject Content Coverage

3.1 Description and Depth of Subject Coverage

3.2 Policy Statements of Subject Coverage and Scope Notes

3.3 Organization of Printed Version by Classification or Other Subject Categorization

3.4 Other Data Bases Useful in Supplementing the Subject Coverage

4. Abstracting

4.1 Abstracting Policies

5. Indexing

5.1 Indexing Policies and Controls or Guidelines

5.2 Authority Lists for Controlled Indexing

5.3 Frequency of Issue of Authority List and Methods For Reporting Interim Vocabulary Changes

5.4 Average Number of Index Terms Assigned Per Document

5.5 Indexing Variations by Type of Document, by Subject Area, or by Language

5.6 Relationships and Cross Referencing Present in the Index or Authority List

5.7 Tips on Using the Authority Lists for Both Manual and Machine Searches

5.8 Tips on Using the Printed Indexes for Both Manual and Machine Searches

6. Catalog Record Fields on Tape

6.1 Description of Catalog Record Fields on Tape

6.2 Data Element Differences Between the Printed and Tape Versions

6.3 Tips About the Fields of Information in the Catalog Records

6.4 Fields that Contain Abbreviations, Symbols, or Codes

7. Data Base Implementation on Retrieval System 1*

7.1 Implementation Begins

7.2 Frequency of File Updates

7.3 Fields of Information that are Indexed by the System or are in its Printable Catalog Record

7.4 Description of Data Element(s) Either Differing From Those on Tape, or Not on Tape but Added by the System

7.5 Catalog Record Element(s) on Tape or in Printed Version but not Implemented by the System

7.6 Retrieval System Organization of Index Files that Access Catalog Records and Differences from Organization of Printed Version Indexes

7.7 Tips on Using the Machine Index Files to Access Catalog Records

7.8 Tips on Vocabulary and other Aids to a Machine Search

7.9 Tips about the Fields of Information (Printable Categories) in the System-Stored Catalog Records

7.10 Fields that Contain Abbreviations, Symbols, or Codes Different from those on the Supplier's Tape

7.11 Catalog Record Field Groups for System Printout Options

7.12 Sample Search of the Data Base on the System Highlighting the Major Features of the Index and Record, and Major Idiosyncracies

7.13 Examples of System Printout of Complete Catalog Records in the Data Base

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* The headings in Section 7 can be used in subsequent sections, each section devoted to an implementation of the data base on a different retrieval system. For example, Section 7 - ORBIT at SDC; Section 8 - DIALOG at Lockheed.

Appendix F

NASIC AT M.I.T.-INQUIRY DATA Date_____ Receiver _____
In-Person___ Phone___ Mail___

USER'S NAME _____

ORG. AND DEPT. _____

ADDRESS _____

_____

PHONE/HOURS _____

ORGANIZATION is Academic Inst.____ Govt. Agency____ Ind./Comm'l.____ Other_____

ACADEMIC STATUS Faculty____ Grad. St.____ Undergrad.____ Other (specify)_____

PREVIOUS USER? Yes____ No____
HOW DID USER SPECIFICALLY LEARN OF NASIC SERVICE? (check all applicable items)
NASIC Direct Mailing ____ Poster or other display____
Library Bulletin____ Demonstration____
Brochure from display rack____ Library staff referral____
Article/Advt. Blurb____ Tech Talk____ The Tech____ Other (specify)_____
Colleague____ (Was colleague a user? Yes____ No____ Don't know____)
Other____ (Specify_____)

FOR MEDLINE USERS (Information requested by Regional Medical Library Service)
NON-STUDENTS Search is for(1)Research__(2)Patient Care__(3)Education__
User is (a) MD, PhD, Physician__(b) Dentist__(c) Nurse__
(d) Allied Health Personnel__(e) Other_____
STUDENTS ONLY Degree Program is (4a) Medical__(4b) Dental__(4c) Nursing__
(4d) Allied Health__(4e) Other (PhD, MS, BS)_____

FOR NCO USE
Type of Search Retrospective___ Quick-Search___ Continuing Awareness___
System(s) SDC___ Lockheed___ NLM___ GIDC___ Other_____
Data Base(s) CAIN___ CHEMCON___ COMPENDEX___ ERIC___ GEOREF___
INFORM___ INSPEC___ (PHYS___ EE___ COMP/CONTROL___)
MEDLINE___ NTIS___ PREDICASIS___ PSYCH___ SCISEARCH___
Other_____
Other Services_____
Search is with I.S._____ Self-Search_____ Delegated to I.S.____
Appointment Date_____ Time_____ Specialist_____ Location_____

BRIEF PROBLEM TITLE_____

_____

UPS given to user _____ Date _____ Brochures sent _____ Date _____

Notes_____

_____

_____

_____

_____

_____

Table G-1

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

NUMBER OF SEARCHES: 202 NASIC, 114 MEDLINE

	ON-LINE RETROSPECTIVE	ON-LINE SDI
NASIC	196	6
MEDLINE	108	6

SEARCH LOCATION:

	NASIC TOTAL	MEDLINE
BARKER ENGINEERING	69	--
DEWEY	18	--
HUMANITIES	38	--
LINDGREN	8	--
ROTCH	22	--
SCIENCE	42	114
OTHER LIBRARY	--	--
COORDINATOR'S OFFICE	5	--
USERS' OFFICE/LAB	--	--
TOTAL	202	114

Table G-2

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

USER AFFILIATION -- ALL DATA BASES

	NASIC SCIENCE AND TECHNOLOGY DATA BASES	NASIC SOCIAL SCIENCE AND HUMANITIES DATA BASES	NASIC TOTAL	MEDLINE
MIT/CAMPUS TOTAL	80	28	108	91
FACULTY	29	5	34	24
GRADUATE STUDENT	38	10	48	41
UNDERGRADUATE	9	6	15	4
OTHER STAFF	4	7	11	22
MIT/LINCOLN	2	4	6	--
DRAPER	--	--	--	--
WELLESLEY	--	--	--	--
OTHER UNIVERSITIES (TOTAL)	3	6	9	3
FACULTY	--	3	3	1
GRADUATE STUDENT	3	3	6	1
UNDERGRADUATE	--	--	--	1
OTHER STAFF	--	--	--	--
GOVT. AGENCIES	--	--	--	--
INDUSTRIAL/ COMMERCIAL	63	16	79	20
OTHER AFFILIATIONS	--	--	--	--

Table G-3

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

USER AFFILIATIONS -- SCIENCE AND TECHNOLOGY DATA BASES:

	CAIN	CHEM	COMPENDEX	GEO-REF	INSPEC	NTIS	SCISEARCH	MEDLINE
MIT/CAMPUS TOTAL	3	27	13	8	9	17	3	91
FACULTY	2	12	1	5	2	5	2	24
GRADUATE STUDENT	1	9	9	3	4	12	--	41
UNDERGRADUATE	--	3	2	--	3	--	1	4
OTHER STAFF	--	3	1	--	--	--	--	22
MIT/LINCOLN	--	2	--	--	--	--	--	--
DRAPER	--	--	--	--	--	--	--	--
WELLESLEY	--	--	--	--	--	--	--	--
OTHER UNIVERSITIES (TOTAL)	--	2	--	--	--	1	--	3
FACULTY	--	--	--	--	--	--	--	1
GRADUATE STUDENT	--	2	--	--	--	1	--	1
UNDERGRADUATE	--	--	--	--	--	--	--	1
OTHER STAFF	--	--	--	--	--	--	--	--
GOVT. AGENCIES	--	--	--	--	--	--	--	--
INDUSTRIAL/ COMMERCIAL	--	14	16	3	8	22	--	20
OTHER AFFILIATIONS	--	--	--	--	--	--	--	--

Table G-4

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

USER AFFILIATIONS -- SOCIAL SCIENCE AND HUMANITIES DATA BASES:

	ERIC	INFORM	PREDICASTS	PSYCH-AB	SOCIAL SCISEARCH
MIT/CAMPUS TOTAL	15	8	2	1	2
FACULTY	2	1	--	1	1
GRADUATE STUDENT	2	5	2	--	1
UNDERGRADUATE	4	2	--	--	--
OTHER STAFF	7	--	--	--	--
MIT/LINCOLN	4	--	--	--	--
DRAPER	--	--	--	--	--
WELLESLEY	--	--	--	--	--
OTHER UNIVERSITIES (TOTAL)	3	1	--	1	1
FACULTY	2	--	--	--	1
GRADUATE STUDENT	1	1	--	1	--
UNDERGRADUATE	--	--	--	--	--
OTHER STAFF	--	--	--	--	--
GOVT. AGENCIES	--	--	--	--	--
INDUSTRIAL/COMMERCIAL	5	4	4	2	1
OTHER AFFILIATIONS	--	--	--	--	--

Table G-5

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

DEPARTMENT AFFILIATIONS OF MIT/CAMPUS USERS -- ALL DATA BASES:

DEPARTMENT	NASIC SCIENCE AND TECHNOLOGY DATA BASES	NASIC SOCIAL SCIENCE AND HUMANITIES DATA BASES	NASIC TOTAL	MEDLINE
AERONAUTICS/ASTRONAUTICS	—	—	—	2
ARCHITECTURE	—	—	—	—
BIOLOGY	2	—	2	27
CHEMICAL ENG.	6	—	6	6
CHEMISTRY	6	—	6	6
CIVIL ENG.	12	4	16	1
EARTH & PLANETARY SCI.	10	1	11	—
ECONOMICS	4	2	6	—
ELECTRICAL ENG.	4	1	5	4
FOR. LITER. & LINGUISTICS	—	—	—	—
HUMANITIES	—	—	—	—
MANAGEMENT	2	5	7	1
MATHEMATICS	1	—	1	—
MECHANICAL ENG.	6	—	6	7
METALLURGY	4	—	4	1
METEOROLOGY	—	—	—	—
NUCLEAR ENG.	1	—	1	—
NUTRITION & FOOD SCI.	6	—	6	29
OCEAN ENG.	4	1	5	—
PHILOSOPHY	—	—	—	—
PHYSICS	2	—	2	1
POLITICAL SCI.	1	1	2	—
PSYCHOLOGY	—	1	1	1
URBAN STUDIES & PLAN.	—	—	—	—
UNDESIGNATED-MAJOR STUDENTS	4	6	10	1
ADMINISTRATIVE OFFICES	1	1	2	—
LIBRARIES	—	3	3	—
MEDICAL DEPARTMENT	—	—	—	2
SPECIAL CENTERS/LABS./PROGRAMS	4	3	7	3

Table G-6

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

DEPARTMENT AFFILIATIONS OF MIT/CAMPUS USERS OF SCIENCE AND TECHNOLOGY DATA BASES:

DEPARTMENT	CAIN	CHEM	COMPENDEX	GEO-REF	INSPEC	NTIS	SCISEARCH	MEDLINE
AERONAUTICS/ASTRONAUTICS	–	–	–	–	–	–	–	2
ARCHITECTURE	–	–	–	–	–	–	–	–
BIOLOGY	–	2	–	–	–	–	–	27
CHEMICAL ENG.	–	5	–	–	–	1	–	6
CHEMISTRY	–	5	–	–	1	–	–	6
CIVIL ENG.	–	–	3	3	–	6	–	1
EARTH & PLANETARY SCI.	–	–	1	7	–	2	–	–
ECONOMICS	1	–	–	–	1	2	–	–
ELECTRICAL ENG.	1	–	–	–	2	1	–	4
FOR. LITER. & LINGUISTICS	–	–	–	–	–	–	–	–
HUMANITIES	–	–	–	–	–	–	–	–
MANAGEMENT	–	1	–	–	1	–	–	1
MATHEMATICS	–	–	–	1	–	–	–	–
MECHANICAL ENG.	–	3	2	–	–	1	–	7
METALLURGY	–	2	1	–	1	–	–	1
METEOROLOGY	–	–	–	–	–	–	–	–
NUCLEAR ENG.	–	1	–	–	–	–	–	–
NUTRITION & FOOD SCI.	–	3	–	–	–	1	2	29
OCEAN ENG.	1	–	1	–	–	1	1	–
PHILOSOPHY	–	–	–	–	–	–	–	–
PHYSICS	–	1	1	–	–	–	–	1
POLITICAL SCI.	–	1	–	–	–	–	–	–
PSYCHOLOGY	–	–	–	–	–	–	–	1
URBAN STUDIES & PLAN.	–	–	–	–	–	–	–	–
UNDESIGNATED-MAJOR STUDENTS	–	–	1	–	3	–	–	1
ADMINISTRATIVE OFFICES	–	–	1	–	–	–	–	–
LIBRARIES	–	–	–	–	–	–	–	–
MEDICAL DEPT.	–	–	–	–	–	–	–	2
SPECIAL CENTERS/LABS./ PROGRAMS	–	3	1	–	–	–	–	2

Table G-7

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

DEPARTMENT AFFILIATIONS OF MIT/CAMPUS USERS OF SOCIAL SCIENCE AND HUMANITIES DATA BASES:

DEPARTMENT	ERIC	INFORM	PREDICASTS	PSYCH-AB	SOCIAL SCISEARCH
AERONAUTICS/ASTRONAUTICS	–	–	–	–	–
ARCHITECTURE	–	–	–	–	–
BIOLOGY	–	–	–	–	–
CHEMICAL ENG.	–	–	–	–	–
CHEMISTRY	–	–	–	–	–
CIVIL ENG.	1	2	–	–	1
EARTH & PLANETARY SCI.	1	–	–	–	–
ECONOMICS	–	1	–	–	1
ELECTRICAL ENG.	–	1	–	–	–
FOR. LITER. & LINGUISTICS	–	–	–	–	–
HUMANITIES	–	–	–	–	–
MANAGEMENT	–	4	1	–	–
MATHEMATICS	–	–	–	–	–
MECHANICAL ENG.	–	–	–	–	–
METALLURGY	–	–	–	–	–
NUCLEAR ENG.	–	–	–	–	–
NUTRITION & FOOD SCI.	–	–	–	–	–
OCEAN ENG.	1	–	–	–	–
PHILOSOPHY	–	–	–	–	–
PHYSICS	–	–	–	–	–
POLITICAL SCI.	1	–	–	–	–
PSYCHOLOGY	–	–	–	1	–
URBAN STUDIES & PLAN.	–	–	–	–	–
UNDESIGNATED-MAJOR STUDENTS	4	2	–	–	–
ADMINISTRATIVE OFFICES	1	–	–	–	–
LIBRARIES	3	–	–	–	–
MEDICAL DEPT.	–	–	–	–	–
SPECIAL CENTERS/LABS./ PROGRAMS	3	–	–	–	–

Table G-8

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

PUBLICITY RESPONSE OF MIT-AFFILIATED USERS: (Combined NASIC and MEDLINE)

	FACULTY	GRAD.	CAMPUS UNDERGRAD.	OTHER	LINCOLN LAB	DRAPER LAB	TOTAL MIT
DIRECT MAILINGS (LTRS. AND/OR BROCHURES)	13	6	--	1	--	--	20
LIBRARY BULLETIN	--	--	--	--	--	--	--
THE TECH ARTICLES	--	--	--	--	--	--	--
TECH TALK ARTICLES	--	4	--	--	--	--	4
OTHER ARTICLES OR ADVT.	--	--	--	--	--	--	--
BROCHURE FROM DISPLAY RACK	3	6	3	4	--	--	16
POSTER OR OTHER DISPLAY	--	6	1	--	--	--	7
DEMONSTRATION	2	1	--	--	--	--	3
COLLEAGUE	8	31	3	11	1	--	54
LIBRARY STAFF REFERRAL	5	6	1	1	1	--	14
OTHER PUBLICITY SOURCES	2	4	8	3	1		18
REPEAT USER	13	17	1	14	3	--	48

Table G-9

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

METHOD OF PAYMENT FOR SERVICES: (Combined NASIC and MEDLINE)

	MIT-USERS						NON-MIT USERS		TOTAL
	FACULTY	GRAD.	UNDER-GRAD.	OTHER	LINCOLN LAB	DRAPER LAB	ACAD.	COMM.	
MIT REQUISITION	55	74	14	29	6	--	--	--	178
PERSONAL CHECK	1	0	4	--	--	--	4	7	24
CASH	--	2	--	--	--	--	--	--	2
PERSONAL BILL THRU MIT	1	4	1	3	--	--	--	--	9
PURCHASE ORDER	1	1	--	2	--	--	8	93	105

Table G-10

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

CHARACTERISTICS OF SEARCHES BY SEARCHER MODE -- ALL DATA BASES

ALL MODES	NASIC SCIENCE AND TECHNOLOGY DATA BASES	NASIC SOCIAL SCIENCE AND HUMANITIES DATA BASES	NASIC TOTAL	MEDLINE
SEARCHES	148	54	202	114
OFF-LINE PRINT REQUESTS	80	18	98	80
USER WITH SPECIALIST				
SEARCHES	136	49	185	95
OFF-LINE REQUESTS	71	15	86	64
DELEGATED TO SPECIALIST*				
SEARCHES	8	2	10	11
OFF-LINE PRINT REQUESTS	8	1	9	9
DELEGATED TO LIBRARIAN WITH I.S.**				
SEARCHES	4	3	7	8
OFF-LINE PRINT REQUESTS	1	2	3	7

* includes periodic entry of on-line SDI search by the information specialist.

** i.e., an end-user has given a problem to a reference librarian who in turn works with the information specialist on the search.

Table G-11

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

CHARACTERISTICS OF SEARCHES BY SEARCH MODE -- SCIENCE AND TECHNOLOGY DATA BASES

ALL MODES	CAIN	CHEM	COMPENDEX	GEO-REF	INSPEC	NTIS	SCISEARCH	MEDLINE
SEARCHES	3	45	29	11	17	40	3	114
OFF-LINE PRINT REQUESTS	—	27	19	3	12	19	—	80
USER WITH SPECIALIST								
SEARCHES	2	40	28	11	17	36	2	95
OFF-LINE REQUESTS	—	22	18	3	12	16	—	64
DELEGATED TO SPECIALIST*								
SEARCHES	—	4	1	—	—	3	—	11
OFF-LINE PRINT REQUESTS	—	4	1	—	—	3	—	9
DELEGATED TO LIBRARIAN** WITH I.S.								
SEARCHES	1	1	—	—	—	1	1	8
OFF-LINE PRINT REQUESTS	—	1	—	—	—	—	—	7

* includes periodic entry of on-line SDI search by the information specialist.
** i.e., an end-user has given a problem to a reference librarian who in turn works with the information specialist on the search.

Table G-12

NASIC AT MIT

SUMMARY DATA

1 MARCH 1974 TO 28 FEBRUARY 1975

CHARACTERISTICS OF SEARCHES BY SEARCHER MODE -- SOCIAL SCIENCE AND HUMANITIES DATA BASES

ALL MODES	ERIC	INFORM	PREDICASTS	PSYCH-AB	SOCIAL SCISEARCH
SEARCHES	27	13	6	4	4
OFF-LINE PRINT REQUESTS	9	5	2	2	–
USER WITH SPECIALIST					
SEARCHES	24	13	6	3	3
OFF-LINE REQUESTS	7	5	2	1	–
DELEGATED TO SPECIALIST*					
SEARCHES	–	–	–	1	1
OFF-LINE PRINT REQUESTS	–	–	–	1	–
DELEGATED TO LIBRARIAN** WITH I.S.					
SEARCHES	3	–	–	–	–
OFF-LINE PRINT REQUESTS	2	–	–	–	–

* includes periodic entry of on-line SDI search by the information specialist.

** i.e., an end-user has given a problem to a reference librarian who in turn works with the information specialist on the search.

Table G-13

NASIC AT MIT SUMMARY DATA

1 March 1974 TO 30 November 1974

CHARACTERISTICS OF ON-LINE SEARCHES:	ALL NASIC DATA BASES	MEDLINE
1. Number of Searches	111	80
2. Average Connect Time (Minutes)	37	41
3. Average Appointment Length (Minutes)	57	65
4. Average Ratio Connect-Time-to-Appointment-Time	.65	.63
5. Number of Appointments with Machine Problems	16	14
6. Ratio of Searches with Machine Problems to Total Searches	.14	.18
7. Average Total Machine Problem Time (Minutes)	14	11
8. Number of Searches with Off-Line Printout Requests	48	52
9. Ratio of Searches with Printout Request to Total Searches	.43	.65
10. Average Off-Line Printout Length (citations)*	173	60*
11. Average Off-Line Printout Charge to User	$20.75	$ 5.84
12. Average Actual Computer plus Administrative Charges to User	$45.96	$13.00
13. Adjusted Average Computer plus Administrative Charge**	$42.92	$15.03
14. Average Specialist Time Charge	$ 7.84	$ 8.81
15. Average Actual User Cost without Printout (unadjusted) (lines 12 + 14)	$53.80	$21.81
16. Average Actual User Cost with Printout (unadjusted) (lines 11 + 15)	$74.55	$27.65

* The average off-line printout length for MEDLINE is number of pages, not number of citations. The number of citations per page varies with the specific print parameters but generally there are, perhaps, at least two citations per page.

** Refer to the discussion in Section V for an explanation of the adjusted charge.

Table G-14

NASIC AT MIT SUMMARY DATA

1 March 1974 TO 30 November 1974

CHARACTERISTICS OF ON-LINE SEARCHES:	CAIN	CHEM	COMPENDEX	ERIC	GEO-REF
1. Number of Searches	3	26	19	18	5
2. Average Connect Time (Minutes)	16	50	24	49	11
3. Average Appointment Length (Minutes)	27	70	52	77	17
4. Average Ratio Connect-Time-to-Appointment-Time	.59	.71	.46	.64	.65
5. Number of Appointments with Machine Problems	1	4	0	4	0
6. Ratio of Searches with Machine Problems to Total Searches	.34	.15	–	.22	–
7. Average Total Machine Problem Time (Minutes)	3	11	–	24	–
8. Number of Searches with Off-Line Printout Requests	0	11	12	5	1
9. Ratio of Searches with Printout Request to Total Searches	0	.42	.63	.28	.20
10. Average Off-Line Printout Length (citations)*	0	195	214	153	93
11. Average Off-Line Printout Charge to User	0	$16.31	$40.58	$12.26	$13.95
12. Average Actual Computer plus Administrative Charges to User	$13.57	$66.81	$48.28	$41.62	$15.38
13. Adjusted Average Computer plus Administrative Charge**	$13.86	$60.00	$46.40	$42.46	$15.77
14. Average Specialist Time Charge	$ 3.89	$ 9.80	$ 6.92	$10.22	$ 4.00
15. Average Actual User Cost without Printout (unadjusted) (lines 12 + 14)	$17.46	$76.61	$55.20	$51.84	$19.38
16. Average Actual User Cost with Printout (unadjusted) (lines 11 + 15)	–	$92.92	$95.78	$64.10	$33.33

* The average off-line printout length for MEDLINE is number of pages, not number of citations. The number of citations per page varies with the specific print parameters but generally there are, perhaps, at least two citations per page.

** Refer to the discussion in Section V for an explanation of the adjusted charge.

Table G-15

NASIC AT MIT SUMMARY DATA

1 March 1974 TO 30 November 1974

CHARACTERISTICS OF ON-LINE SEARCHES:	INFORM	INSPEC	NTIS	PREDICASTS	SCISEARCH
1. Number of Searches	11	6	18	2	3
2. Average Connect Time (Minutes)	23	44	30	56	19
3. Average Appointment Length (Minutes)	47	58	49	83	27
4. Average Ratio Connect-Time-to-Appointment-Time	.49	.76	.61	.68	.70
5. Number of Appointments with Machine Problems	1	1	4	1	0
6. Ratio of Searches with Machine Problems to Total Searches	.09	.17	.22	.50	0
7. Average Total Machine Problem Time (Minutes)	5	4	13	20	—
8. Number of Searches with Off-Line Printout Requests	4	3	10	2	0
9. Ratio of Searches with Printout Request to Total Searches	.36	.50	.55	1.00	—
10. Average Off-Line Printout Length (citations)*	91	125	104	416	—
11. Average Off-Line Printout Charge to User	$ 9.05	$ 7.30	$10.60	$ 41.60	—
12. Average Actual Computer plus Administrative Charges to User	$27.44	$53.48	$33.81	$119.32	$36.69
13. Adjusted Average Computer plus Administrative Charge**	$26.60	$52.80	$31.00	$ 80.27	$36.73
14. Average Specialist Time Charge	$ 6.32	$ 7.89	$ 6.57	$ 11.00	$ 3.55
15. Average Actual User Cost without Printout (unadjusted) (lines 12 + 14)	$33.76	$61.37	$40.38	$130.32	$40.24
16. Average Actual User Cost with Printout (unadjusted) (lines 11 + 15)	$42.81	$68.67	$50.98	$171.92	—

* The average off-line printout length for MEDLINE is number of pages, not number of citations. The number of citations per page varies with the specific print parameters but generally there are, perhaps, at least two citations per page.

** Refer to the discussion in Section V for an explanation of the adjusted charge.

Appendix H

SAMPLE PROMOTIONAL MATERIALS

DEMONSTRATION OF COMPUTER-AIDED LITERATURE RETRIEVAL IN
PSYCHOLOGY AND THE SOCIAL SCIENCES

FRIDAY, DECEMBER 6
2:00 P.M.
ROTCH LIBRARY (ROOM 7-238)

You are invited to attend a demonstration of on-line bibliographic retrieval of social science and psychology literature featuring two new data bases now available through M.I.T. Libraries' automated search service (M.A.S.I.C.). The demonstration, which will last about 20 minutes, will feature PSYCHOLOGICAL ABSTRACTS and SOCIAL SCISEARCH (Social Science Citation Index), the computerized versions of these printed abstracting and indexing services.

Some of the special features of machine searching will be illustrated, such as the:

* IMMEDIATE RETRIEVAL OF A SUBJECT BIBLIOGRAPHY (a typical search may take 10 or 20 minutes compared to 5 days of equivalent manual searching of printed indexes)

* SPECIFICITY AND THOROUGHNESS (data bases generally have many more retrieval points per citation than printed indexes; in addition, boolean logic allows greater search flexibility than printed indexes, e.g. in one command to the computer, you can request a combined search by author, year, subject, preferred language, and type of publication and immediately pull all documents meeting those exact specifications)

* COST EFFECTIVENESS TO THE USER (although the fee for service initially appears high, the true user cost is kept lower than manual search costs, because a search is completed in far less time, e.g. a machine print-out of 200-300 citations can be produced in a minute or two, while a trained reference librarian can retrieve perhaps 20-30 per hour. If the personnel time and subscription cost for the index are factored in, the cost per manual search far exceeds the computer search)

A word about the data bases to be demonstrated...

PSYCHOLOGICAL ABSTRACTS is the automated version of the monthly publication of the American Psychological Association, which abstracts the world's scientific literature in psychology and related disciplines under 17 major classifications, such as: Personality, Cognitive Processes and Motivation. Over 800 journals, technical reports, monographs and scientific documents are covered in PA from 1967 to date.

SOCIAL SCISEARCH reflects comprehensive journal coverage of world-wide literature in 50 broad social science subject areas from 1973, when the index began, to the present. The concept of citation searching makes this a very unique and valuable data base. Like its scientific counterpart, Science Citation Index (the life sciences portion of which is also available at M.I.T. in computerized format), SOCIAL SCISEARCH enables you to search forward as well as backward in time by utilizing the theory that a subject relationship exists between a cited author and the author citing him. In addition, of course, subject, or key word searching is available on this base just as it is on all others. (The MASIC Service now offers 15 data bases in virtually all areas of research.)

FOR MORE INFORMATION ON THIS DEMONSTRATION OR THE MASIC SERVICE, CALL THE MASIC COORDINATOR'S OFFICE (x3-7746, ROOM 14SN-48)

NOW THERE'S AN EASIER, FASTER WAY TO FIND INFORMATION- COME SEE RESEARCH IN HIGH GEAR!

MIT

BARKER ENGINEERING LIBRARY BULLETIN

Room 10-500
Massachusetts Institute of Technology
Cambridge, Massachusetts
02139

Biomedical Engineering
Civil Engineering
Electrical Engineering
Energy Resources and Utilization
Environmental Engineering
Mechanical Engineering
Ocean Engineering
Transportation

Volume 9 Number 4 25 February 1975

COMPUTER-AIDED SEARCHING OF POLLUTION INFORMATION

The following data bases, presently available through NASIC, contain information on pollution. In all these data bases, pollution is only one of many subjects covered.

NTIS, the data base which corresponds to Government Reports Announcements, includes citations, plus abstracts, to U.S. government technical reports on topics of environmental concern. The spectrum of pollution coverage is broad; reports on pollution of the air, land, and water by noise, oil, thermal discharges, for example, are covered in depth. The data base may be searched for references to reports announced during the past ten years.

COMPENDEX, the machine readable equivalent of Engineering Index from 1970 to the present, covers journal articles and conference proceedings that deal with pollution of the air and water, in addition to publications on sewage treatment, land reclamation, and noise abatement. Citations from this file include abstracts.

CHEMCON, the on-line version of Chemical Abstracts, contains citations to selected journals, conference proceedings, monographs and patents on chemical aspects of pollution of the air and water and treatment of wastes and sewage, including a section on toxicology. This base covers literature from 1970 to the present. Beginning in January 1975, abstracts are available for citations that cover ecology and the environment, as well as other selected areas.

CAIN, produced by the National Agricultural Library, includes references, without abstracts, to journal and monographic literature from 1970 to the present. It includes information on natural resources management and environmental pollution.

One of the newest data bases, offered on an experimental basis is called, simply, Pollution; this data base contains citations but no abstracts, to information on various types of pollution: pollution of the air, land, and water as well as pollution due to noise, thermal discharge, and oil spills. Legislation, court decisions, and treaties as well as foreign and domestic technical reports, journals, newspapers, and symposia are monitored for inclusion. This base is currently being evaluated for inclusion in the NASIC service, and can be searched upon request.

How Searches Work

All searching is done by appointment so that the user can be assured the undivided attention of a trained Information Specialist during the search. The user will be asked to fill out a form describing the search topic so that preparatory work, such as the search logic, can be undertaken before the appointment in order to reduce computer costs. Appointments, or consultations about a search, can be made indirectly through any of the five libraries, or directly through the NASIC Coordinating Office.

Services Available

Basically, the NASIC service provides two kinds of searches which generate a printed bibliography of selected documents that you take away with you. Retrospective searches cover several years of literature and give a printed list of references retrieved for those years. Citations include title, author, source of reference and index terms, and some additional categories of information, e.g. abstracts for some data bases. Current awareness (or alerting) searches provide bi-weekly, monthly or quarterly updates of recent publications on a particular topic specified by the user.

Cost of Searches

NASIC services are available to researchers as well as to any member of the M.I.T. community. Charges depend upon the data base used, the amount of computer time expended, and the number of citations printed off-line. Higher rates are in effect for industrial or commercial users.

Demonstrations of computer searches are held in the various divisional libraries. Watch for detailed announcements in Tech Talk. On Thursday, March 13th, a free all-day demonstration (9:30 a.m. - 5 p.m.) will be held in the map room of the Science Library(14S-100) You are invited to bring questions and to try out the system. Trained Information Specialists will be on hand to enter your terms and to negotiate the search. For times during the day when specific data bases will be featured, or for further general information, please call the NASIC Coordinating Office, x7746 (14SM-48) or watch for an announcement in the Institute newspapers.

****

SELECTED NEW BOOKS

ACOUSTICS

Diehl, G.
Machinery Acoustics [73]
TJ153 .D53 1973

BIOMEDICAL ENGINEERING

Charm, S.
Blood Flow and Microcirculation [1974]
QP105.4 .C45 1974

Problems of Heat and Mass Transfer Biotechnology [1974]
QP88 .P7 Microfich

CIVIL ENGINEERING

Pisa. Universita Instituto di Scienza della Costruzioni.
Atti, v. 13, 1972 [1973]
TA7 .P673 v.13 1972/73

COMMUNICATION

Davies, W.
Communication Networks for Computers [1973]
TK5105.5 .D38

U.S. Office of Telecommunications
A Survey of Technical Requirements for Broadband Cable Teleservices [1973]
TK6675 .U5 v.1 - v. 7

CONSTRUCTION

Dell'Isola, A.
Value Engineering in the Construction Industry, 2d ed. [1974]
TH437 .D43 1974

STUDENTS, FACULTY, RESEARCHERS

Writing a paper?
Researching a thesis?
Updating a course?

LIGHTEN YOUR LOAD WITH COMPUTER-AIDED LITERATURE SEARCHING!

NASIC* now provides access to 15 bibliographic data bases in all areas of research at MIT — and our files are still growing! Hire a trained Information Specialist to help you get at the information you need. Our on-line service is fast and efficient — where else can you get a tailor-made bibliography you can take away with you in a matter of minutes?

Service is available in the libraries by appointment 9-5, Monday through Friday. For a price list and further information, contact the NASIC Coordinator's Office, Ext. 3-7746, Room 14sm-48, (first mezzanine above the Science Library).

(Like a sample? Free demos are available to interested research groups or departments upon request.)

*Northeast Academic Science Information Center, a program of the New England Board of Higher Education available through the MIT Libraries.

All-day Teach-In & Information Bazaar

DEMONSTRATION OF COMPUTER-AIDED LITERATURE SEARCHING

******* *14 Data Bases -- FREE Searches and Reference Print-Outs* *******

Thursday, March 13th – Stein Map Room, Science Library (Room 14s-100)

Time	Major Literature Field Covered	Data Base Demonstrated
9:30–11:00	Social Sciences, Humanities, Educational Research, Psychology & Behavioral Sciences, Geosciences, Meteorology, Government R & D. Reports in these areas.	Social Sciesearch, Eric, Psychological Abstracts, Georef, Ntis
11:00–2:00	Civil, Chemical, Mechanical, Nuclear, Ocean Engineering, Pollution & Environment, Physics, Electrical and Electronics Technology, Computers & Control, Chemistry, Government R & D. Reports in these areas.	Compendex, Chem Con, Inspec, Ntis, Pollution
2:00–4:00	Medicine, Cancer & Toxicology, Biology & Life Sciences, Nutrition, Environmental Pollution, Food Science & Agriculture, Bioengineering, Government R & D. Reports in these areas.	Medline, Scisearch, Cain, Ntis, Pollution, Inspec
4:00–5:30	Business Management, Marketing, Forecasting, Government R & D. Reports in these areas.	Inform, Predicasts, Ntis

In order to better acquaint the MIT Community with the Institute's computerized information search service (NASIC), you are invited to a day of continous free searching of the data bases listed above. If you can't make the time slot allocated to your particular interest, come anyway – the demonstrations and explanations in *any* field will be helpful introductions to machine retrieval of bibliographic citations.

Please bring sample questions to try out on the system – we will try to guarantee at least 5 minutes of Information Specialist-assisted searching, plus any on-line reference print-outs retrieved.

** Free food, coffee

DROP BY AND GET ACQUAINTED!

FOR MORE INFORMATION, CONTACT THE NASIC COORDINATOR'S OFFICE
ROOM 14SM-48, X7746

*** IMPORTANT ANNOUNCEMENT ***

INFORMATION - BAZAAR AT MIT

ALL-DAY TEACH-IN/DEMONSTRATION OF COMPUTER-AIDED LITERATURE SEARCHING

Date: Thursday, March 13th
Time: 9:30 A.M. - 5:30 P.M.
Place: Stein Map Room, Science Library (Room 14S-100)

We are pleased to invite your participation in a free all-day demonstration of the various data bases of the NASIC- Northeast Academic Science Information Center- search service. Since November, 1973, M.I.T. has had in operation a computer-assisted library search program which provides rapid access to 14 bibliographic files (more than 3.5 million references) in subject areas covering most fields of research at the Institute. Through terminals located at each of the five divisional libraries, computers are accessed in California, New York, and Maryland to obtain bibliographies tailor-made to a user's request. Each library has trained information specialists to assist the user in translating the research problem into the language of the pertinent data base. Search fees are based on the data base used, time actually connected to the terminal, and off-line citations generated. At relatively low cost, highly relevant search results are obtained for a fraction of the time and effort associated with traditional manual techniques of literature searching.

To help the M.I.T. community become better acquainted with this service, a continuous, free, all-day session will be held March 13th, featuring specific data bases at different times. You are invited to bring sample questions to try out the data base(s) of your choice. Even if you can't make the

time frame allocated to your particular subject interest, come anyway- the demonstrations, sample searches, and explanations of machine searching in any discipline will provide a useful introduction to these techniques. Information specialists will be on hand to help negotiate your questions. Searches can be undertaken by key word, author, and title. Certain other retrieval categories which are unique to particular data bases can be explained at the session you attend.

We will try to give everyone who comes at least 5 minutes of free on-line time to develop a printed reference list that can be taken away. We particularly urge classes, labs, and other related interest groups to come together to explore the possibilities of computer reference retrieval in your area of research. Retrieval of bibliographic information by computer is a new and rapidly developing field-come and see what it can do for you, now and in the future!

The agenda for this one-day session is:

TIME	MAJOR LITERATURE FIELD COVERAGE	DATA BASE DEMONSTRATED *
9:30-11:00	Social Sciences, Humanities, Educational Research, Psychology & Behavioral Sciences, Geosciences, Meteorology, Government R.& D. Reports in these areas	SOCIAL SCISEARCH, ERIC, PSYCHOLOGICAL ABSTRACTS, GEOREF, NTIS
11:00-2:00	Civil, Chemical, Mechanical, Nuclear, Ocean Engineering, Pollution & Environment, Physics, Electrical and Electronics Technology, Computers & Control, Chemistry, Government R. & D.Reports in these areas	COMPENDEX, CHEM CON, INSPEC, NTIS, POLLUTION
2:00-4:00	Medicine, Cancer & Toxicology, Biology & Life Sciences, Nutrition, Environmental Pollution, Food Science & Agriculture, Bioengineering, Government R.& D. Reports in these areas	MEDLINE, SCISEARCH, CAIN, NTIS, POLLUTION, INSPEC
4:00-5:30	Business, Management, Marketing, Forecasting, Government R.& D. Reports in these areas	INFORM, PREDICASTS, NTIS

*See attached pages for individual data base descriptions.

IF YOU'VE EVER WONDERED WHAT NASIC WAS ALL ABOUT, NOW IS THE TIME TO FIND OUT! DROP BY AND GET ACQUAINTED!

(Free coffee, food available all day)

DATA BASES CURRENTLY AVAILABLE THROUGH THE NASIC SERVICE....

CHEMCON - This base derives from Chemical Abstracts, covering some 1,100,000 documents in five major areas: biochemistry; organic chemistry; macromolecular chemistry; applied and chemical engineering; physical and analytical chemistry. Includes patents, conference proceedings, and articles from over 12,000 international journals. Coverage: 1970 to date. Updates: 6000 documents added every two weeks.

CAIN - The cataloging and indexing files of the National Agricultural Library. Citations correspond to those in The Bibliography of Agriculture, the American Bibliography of Agricultural Economics, and the Food and Nutrition file from the Food and Nutrition Information and Educational Materials Center. Provides international and comprehensive coverage to over 400,000 documents related to these areas (eg. animal science, consumer protection). Coverage: 1970 to date. Updates: 1200 new records added monthly.

COMPENDEX - The data base which corresponds to Engineering Index. Covers over 275,000 citations and abstracts from more than 3500 journals, society and trade publications, selected monographs and government reports in all engineering and related disciplines (eg. energy, transportation). Coverage: 1970 to date. Updates: 7000 new records added monthly.

ERIC - The complete file of education and related materials from the Education Resources Information Center maintained by the U.S. Office of Education. Contains records for over 135,000 reports and journal articles in the main educational base(ERIC). Subfiles include: Exceptional Children Abstracts (over 12,000 abstracts) and Abstracts of Instructional and Research Materials (over 7000 abstracts). Coverage: 1966 to date. Updates: over 1000 new reports and 1500 journal articles added monthly.

GEOREF - This file, produced by the American Geological Institute, provides references to over 190,000 documents in the field of the geosciences and related technologies. International overage is provided to more than 3000 journals, conference and symposia proceedings, U.S. and Canadian theses, and major monographs in geology and related areas (eg. oceanology). Coverage:1967 to date. Updates: more than 3000 new records added per month.

INFORM - This base of approximately 10,000 documents is produced by a commercial service - Abstracted Business Information - which selectively covers some 280 business and financial journals. Coverage: 1971 to date. Updates: approximately 900 new articles are added per month.

INSPEC - The INSPEC bases, corresponding to the three sections of the Science Abstracts publication (Physics Abstracts, Electrical and Electronics Abstracts, and Computers and Control Abstracts) are produced by the Institution of Electrical Engineers (I.E.E.). Over 2000 periodicals, 500 conference proceedings, 4000 reports, 2500 theses, 3000 patents, and 300 books are indexed each year from world-wide literature. Over 400,000 items are presently available for computer recall. Coverage: 1970 to date. Updates: 11,000 new records added monthly.

MEDLINE - The only non-NASIC data base, which is made available to the service through the National Library of Medicine. Covers some 14,550,000 records from the leading biomedical journals, corresponding roughly to the Index Medicus publication. Coverage: 1969 to date. Updates: monthly.

NTIS - the complete Weekly Government Reports/Announcements file from the National Technical Information Service. Covers government-sponsored research in 22 major subject disciplines from over 240 agencies, including NASA, DDC, AEC, HEW, HUD, DOT, the Dept. of Commerce, etc. Government-sponsored translations are also included. Coverage: 1964 to date. Updates: over 2500 records added every two weeks. NOTE: Through special arrangement with NTIS,the documents themselves can be ordered on -line in fiche, film, or hard copy format.

POLLUTION - Covers 30,000 citations in all major areas of pollution. Covers journals, conference proceedings, government reports, business and trade publications and materials

of limited or foreign circulation. This is a new, experimental file. Coverage: 1970 to date. Updates: monthly.

PREDICASTS - Consists of several data bases. CHEMICAL AND ELECTRONIC MARKET ABSTRACTS covers over 50,000 abstracts of domestic and foreign information on all chemical process and electronics and data processing equipment industries. Coverage: 1972 to date. Updates:2500 new records added per month. The F&S INDEXES represent 250,000 records covering new technologies and products, legislation affecting business, industry trends, company studies, etc. World-wide coverage is provided to over 1000 sources, including newspapers, business publications, trade journals, bank reviews, government publications, and analytical reports of investment advisory services. Coverage: 1972 to date. Updates: monthly.

PSYCHOLOGICAL ABSTRACTS - The on-line equivalent of the monthly publication of the American Psychological Association . Abstracts the world's scientific literature in psychology and related disciplines under 17 major classifications (eg. Cognitive Processes and Motivation). Over 800 journals, technical reports, monographs, and scientific treatises are monitored for inclusion. Coverage: 1967 to date. Updates: Approximately 200 new records are added per month.

SOCIAL SCISEARCH - Reflects world-wide journal coverage in 50 broad social science and humanities subjects. The current file of over 300,000 records is one of two bases produced by the Institute for Scientific Information which offers citation searching. Citation searching utilizes the theory that a subject relationship exists between a cited author and the author citing him. In this way it is possible to search forward in time as well as backward (eg. all 1975 references to a major article published in 1957 will probably be related in some way). Coverage: 1972 to date. Updates: 7000 new items added per month.

SCISEARCH - The life sciences portion of Science Citation Index. This data base covers over 400,000 references and also provides citation searching (see SOCIAL SCISEARCH) of more than 1,100 of the world's most important life sciences journals. Comprehensive coverage is provided in all disciplines within the life sciences, including such areas as endocrinology, drug research, molecular biology, and cytology and pathology. NOTE: This data base, like NTIS,also can provide on-line ordering of full-text copies of retrieved articles through the Institute for Scientific Information, which produces this base.

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NEW DATA BASES - A number of new data bases are under consideration at this time for incorporation into our service. Ask about them when you come. We welcome your suggestions on data bases relevant to your needs.

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If you wish more detailed information on any of the bases described above, please contact the NASIC Coordinator's Office: x-7746.